Dell™ PowerVault™ 56F 16-Port Fibre Channel Switch

INSTALLATION AND TROUBLESHOOTING GUIDE

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Safety Instructions

Use the following safety guidelines to ensure your own personal safety and to help protect your computer or storage system from potential damage.

Notes, Notices, Cautions, and Warnings

Throughout this guide, blocks of text may be accompanied by an icon and printed in bold type or in italic type. These blocks are notes, notices, cautions, and warnings, and they are used as follows:

NOTE: A NOTE indicates important information that helps you make better use of your computer system.

NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

CAUTION: A CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

WARNING: A WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious bodily injury.

Safety Caution and Warnings

Observe the following caution and warnings while servicing this system:

CAUTION: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

WARNING: The power supplies in your computer or storage system may produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer covers and access any of the components inside the computer. This warning applies to Dell PowerEdge 4*xxx* or higher servers and Dell PowerVault 2*xx*S storage systems.

WARNING: This system may have more than one power supply cable. To reduce the risk of electrical shock, a trained service technician must disconnect all power supply cables before servicing the system.

DŮLEŽITÉ UPOZORNĚNÍ: Tento systém může mít více napájecích kabelů. Ke snížení rizika úrazu elektrickým proudem je nutné, aby školený servisní technik před prováděním servisu systému odpojil všechny napájecí kabely.

ADVARSEL: Dette system kan have mere end et strømforsyningskabel. For at reducere risikoen for elektrisk stød, bør en professionel servicetekniker frakoble alle strømforsyningskabler, før systemet serviceres.

VAROITUS: Tässä järjestelmässä voi olla useampi kuin yksi virtajohto. Sähköiskuvaaran pienentämiseksi ammattitaitoisen huoltohenkilön on irrotettava kaikki virtajohdot ennen järjestelmän huoltamista.

ПРЕДУПРЕЖДЕНИЕ: Данная система может иметь несколько кабелей электропитания. Во избежание электрического удара квалифицированный техник должен отключить все кабели электропитания прежде, чем приступить к обслуживанию системы.

OSTRZEŻENIE: System ten może mieć więcej niż jeden kabel zasilania. Aby zmniejszyć ryzyko porażenia prądem, przed naprawą lub konserwacją systemu wszystkie kable zasilania powinny być odłączone przez przeszkolonego technika obsługi.

ADVARSEL! Det er mulig at dette systemet har mer enn én strømledning. Unngå fare for støt: En erfaren servicetekniker må koble fra alle strømledninger før det utføres service på systemet.

VARNING: Detta system kan ha flera nätkablar. En behörig servicetekniker måste koppla loss alla nätkablar innan service utförs för att minska risken för elektriska stötar.

Additional Safety Precautions

To reduce the risk of bodily injury, electrical shock, fire, and damage to the equipment, observe the following precautions.

General Precautions

Observe the following general precautions for using and working with your system:

- Observe and follow service markings. Do not service any Dell product except as explained in your Dell system documentation. Opening or removing covers that are marked with the triangular symbol with a lightning bolt may expose you to electrical shock. Components inside these compartments should be serviced only by a Dell authorized service technician.

- If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your Dell authorized service provider:
  - The power cable, extension cable, or plug is damaged.
  - An object has fallen into the product.
  - The product has been exposed to water.
  - The product has been dropped or damaged.
  - The product does not operate correctly when you follow the operating instructions.
- Keep your system components away from radiators and heat sources. Also, do not block cooling vents.
- Do not spill food or liquids on your system components, and never operate the product in a wet environment. If the computer gets wet, see the appropriate chapter in your troubleshooting guide or contact a Dell-authorized service provider.
- Do not push any objects into the openings of your system components. Doing so can cause fire or electric shock by shorting out interior components.
- Use the product only with Dell products or other Dell-approved equipment.
- Allow the product to cool before removing covers or touching internal components.
- Use the correct external power source. Operate the product only from the type of power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your Dell service provider or local power company.
- To help avoid damaging your system components, be sure the voltage selection switch (if provided) on the power supply is set to match the power available at your location:
  - 115 volts (V)/60 hertz (Hz) in most of North and South America and some Far Eastern countries such as South Korea and Taiwan
  - 100 V/50 Hz in eastern Japan and 100 V/60 Hz in western Japan
  - 230 V/50 Hz in most of Europe, the Middle East, and the Far East

  Also be sure that your monitor and attached devices are electrically rated to operate with the power available in your location.
- Use only approved power cable(s). If you have not been provided with a power cable for your computer or storage system or for any AC-powered option intended for your system, purchase a power cable that is approved for use in your country. The power cable must be rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cable should be greater than the ratings marked on the product.
- To help prevent electric shock, plug the system components and peripheral power cables into properly grounded electrical outlets. These cables are equipped with three-prong plugs to help ensure proper grounding. Do not use

adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a three-wire cable with properly grounded plugs.

- Observe extension cable and power strip ratings. Make sure that the total ampere rating of all products plugged into the extension cable or power strip does not exceed 80 percent of the extension cable or power strip ampere ratings limit.
- Do not use appliance/voltage converters or kits sold for appliances with your Dell product.
- To help protect your system components from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).
- Position system cables and power cables carefully; route system cables and the power cable and plug so that they cannot be stepped on or tripped over. Be sure that nothing rests on your system components' cables or power cable.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local/national wiring rules.
- To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.
- Handle batteries carefully. Do not disassemble, crush, puncture, short external contacts, dispose of in fire or water, or expose batteries to temperatures higher than 60 degrees Celsius (140 degrees Fahrenheit). Do not attempt to open or service batteries; replace batteries only with batteries designated for the product.
- Turn down the volume before using headphones or other audio devices.

Precautions for Server and Storage Systems

Observe the following additional safety guidelines for your system:

- Unless your installation and/or troubleshooting documentation specifically allows it, do not remove enclosure covers, attempt to override the safety interlocks, or access any components inside the system. Depending on your system, installation and repairs may be done only by individuals who are qualified to service your computer or storage system equipment and trained to deal with products capable of producing hazardous energy levels.
- When connecting or disconnecting power to hot-pluggable power supplies, if offered with your Dell product, observe the following guidelines:
  - — Install the power supply before connecting the power cable to the power supply.
  - — Unplug the power cable before removing the power supply.
  - — If the system has multiple sources of power, disconnect power from the system by unplugging *all* power cables from the power supplies.

- Move products with care; ensure that all casters and/or stabilizers are firmly connected to the computer or storage system. Avoid sudden stops and uneven surfaces.

Precautions for Rack-Mountable Products

Observe the following precautions for rack stability and safety. Also refer to the rack installation documentation accompanying the system and the rack for specific warning and/or caution statements and procedures.

WARNING: Installing Dell system components in a Dell rack without the front and side stabilizers installed could cause the rack to tip over, potentially resulting in bodily injury under certain circumstances. Therefore, always install the stabilizers before installing components in the rack.

After installing system components in a rack, never pull more than one component out of the rack on its slide assemblies at one time. The weight of more than one extended component could cause the rack to tip over and injure someone.

NOTE: Dell's server and storage systems are certified as components for use in Dell's rack cabinet using the Dell customer rack kit. The final installation of Dell systems and rack kits in any other brand of rack cabinet has not been approved by any safety agencies. It is the customer's responsibility to have the final combination of Dell systems and rack kits for use in other brands of rack cabinets evaluated for suitability by a certified safety agency.

- System rack kits are intended to be installed in a Dell rack by trained service technicians. If you install the kit in any other rack, be sure that the rack meets the specifications of a Dell rack.
- Do not move large racks by yourself. Due to the height and weight of the rack, Dell recommends a minimum of two people to accomplish this task.
- Before working on the rack, make sure that the stabilizers are secure to the rack, extend to the floor, and that the full weight of the rack rests on the floor. Install front and side stabilizers on a single rack or front stabilizers for joined multiple racks before working on the rack.
- Always load the rack from the bottom up, and load the heaviest item in the rack first.
- Make sure that the rack is level and stable before extending a component from the rack.
- Extend only one component at a time from the rack.
- Use caution when pressing the component rail release latches and sliding a component into or out of a rack; the slide rails can pinch your fingers.
- After a component is inserted into the rack, carefully extend the rail into a locking position, and then slide the component into the rack.
- Do not overload the AC supply branch circuit that provides power to the rack. The total rack load should not exceed 80 percent of the branch circuit rating.

- Ensure that proper airflow is provided to components in the rack.
- Do not step on or stand on any system/component when servicing other systems/components in a rack.

Precautions for Products With Modems, Telecommunications, or Local Area Network Options

Observe the following guidelines when working with options:

- Do not connect or use a modem or telephone during a lightning storm. There may be a risk of electrical shock from lightning.
- Never connect or use a modem or telephone in a wet environment.
- Do not plug a modem or telephone cable into the network interface controller (NIC) receptacle.
- Disconnect the modem cable before opening a product enclosure, touching or installing internal components, or touching an uninsulated modem cable or jack.
- Do not use a telephone line to report a gas leak while you are in the vicinity of the leak.

Precautions for Products With Laser Devices

Observe the following precautions for laser devices:

- Do not open any panels, operate controls, make adjustments, or perform procedures on a laser device other than those specified in the product's documentation.
- Only authorized service technicians should repair laser devices.

When Working Inside Your Computer

Before you remove the computer covers, perform the following steps in the sequence indicated.

NOTICE: Some Dell systems can be serviced only by trained service technicians because of high voltages and energy hazards. Do not attempt to service the computer system yourself, except as explained in this guide and elsewhere in Dell documentation. Always follow installation and service instructions closely.

NOTICE: To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.

1. Turn off your computer and any devices.
2. Ground yourself by touching an unpainted metal surface on the chassis, such as the metal around the card-slot openings at the back of the computer, before touching anything inside your computer.

   While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components.
3. Disconnect your computer and devices from their power sources. Also, disconnect any telephone or telecommunication lines from the computer.

   Doing so reduces the potential for personal injury or shock.

In addition, take note of these safety guidelines when appropriate:

- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, make sure that both connectors are correctly oriented and aligned.
- Handle components and cards with care. Don't touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a microprocessor chip by its edges, not by its pins.

CAUTION: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your computer. To prevent static damage, discharge static electricity from your body before you touch any of your computer's electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface on the computer chassis.

As you continue to work inside the computer, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component in your computer. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.

- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

The following notice may appear throughout this document to remind you of these precautions:

NOTICE: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

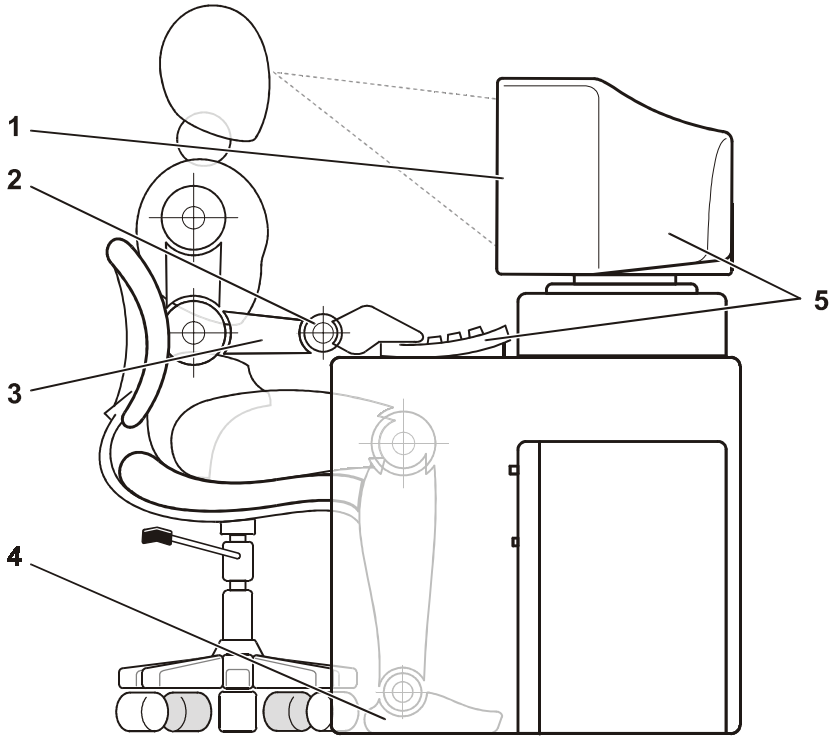
Ergonomic Computing Habits

CAUTION: Improper or prolonged keyboard use may result in injury.

CAUTION: Viewing the monitor screen for extended periods of time may result in eye strain.

For comfort and efficiency, observe the following ergonomic guidelines when you set up and use your computer system:

- Position your system so that the monitor and keyboard are directly in front of you as you work. Special shelves are available (from Dell and other sources) to help you correctly position your keyboard.
- Set the monitor at a comfortable viewing distance (usually 510 to 610 millimeters [20 to 24 inches] from your eyes).
- Make sure that the monitor screen is at eye level or slightly lower when you sit in front of the monitor.
- Adjust the tilt of the monitor, its contrast and brightness settings, and the lighting around you (such as overhead lights, desk lamps, and the curtains or blinds on nearby windows) to minimize reflections and glare on the monitor screen.
- Use a chair that provides good lower back support.
- Keep your forearms horizontal with your wrists in a neutral, comfortable position while you use the keyboard or mouse.
- Always leave space to rest your hands while you use the keyboard or mouse.
- Let your upper arms hang naturally at your sides.
- Sit erect, with your feet resting on the floor and your thighs level.
- When sitting, make sure the weight of your legs is on your feet and not on the front of your chair seat. Adjust your chair's height or use a footrest, if necessary, to maintain proper posture.
- Vary your work activities. Try to organize your work so that you do not have to type for extended periods of time. When you stop typing, try to do things that use both hands.



1	Monitor screen at or below eye level
2	Wrists relaxed and flat
3	Arms at desk level
4	Feet flat on the floor
5	Monitor and keyboard positioned directly in front of user

Preface

About This Guide

This guide is intended for anyone who is installing and managing a Dell PowerVault 56F 16-Port Fibre Channel switch. It is to be used by field technicians, hardware and software engineers, and system administrators for monitoring and troubleshooting the switch. The chapters and appendixes are summarized as follows:

- Chapter 1, "Installing the Dell™ PowerVault™ 56F 16-Port Fibre Channel Switch," provides detailed information to users who are installing a PowerVault 56F.
- Chapter 2, "PowerVault 56F 16-Port Fibre Channel Switch Topologies," discusses Fabric elements and provides sample topologies.
- Chapter 3, "Managing the PowerVault 56F 16-Port Fibre Channel Switch," contains information and examples on managing and monitoring the switch.
- Chapter 4, "PowerVault 56F 16-Port Fibre Channel Switch Commands," contains general operation and diagnosis command information.
- Chapter 5, "Troubleshooting," discusses troubleshooting, diagnostic testing, and error messages.
- Chapter 6, "Repair and Replacement," describes the removal and installation of field-replaceable units.
- Chapter 7, "Getting Help," describes the help tools Dell provides to assist you should you have a problem with the computer. It also explains how and when to call Dell for technical assistance.
- Appendix A, "Error Messages," explains the error message format, error message by firmware module, and other possible errors.

Warranty and Return Policy Information

Dell Computer Corporation ("Dell") manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices.

Other Documents You May Need

Besides this *Installation and Troubleshooting Guide*, the following documentation is included with your system:

- The *Dell PowerVault 56F 16-Port Fibre Channel Switch User's Guide* introduces the user to the PowerVault 56F and includes feature information and specifications.
- The *Dell PowerVault Switch Manager User's Guide* describes the Dell PowerVault Switch Manager and how to use each of its funtions.
- The *Dell PowerVault 5xF Switches Zoning Guide* describes using the Dell PowerVault 5*x*F switches to segment their storage area network (SAN) into zones.
- Technical information files—sometimes called "README" files—may be installed on software media packaged with your PowerVault 56F to provide last-minute updates about technical changes to your switch or advanced technical reference material intended for experienced users or technicians.

Typographical Conventions

The following list defines (where appropriate) and illustrates typographical conventions used as visual cues for specific elements of text throughout this document:

- *Keycaps*, the labeling that appears on the keys on a keyboard, are enclosed in angle brackets.

  Example: <Enter>

- *Key combinations* are series of keys to be pressed simultaneously (unless otherwise indicated) to perform a single function.

  Example: <Ctrl><Alt><Enter>

- *Commands* presented in lowercase bold are for reference purposes only and are not intended to be typed when referenced.

  Example: "Use the **format** command to . . . ."

  In contrast, commands presented in the Courier New font are part of an instruction and intended to be typed.

  Example: "Type `format a:` to format the diskette in drive A."

- *Filenames* and *directory names* are presented in lowercase bold.

  Examples: **autoexec.bat** and **c:\windows**

- *Syntax lines* consist of a command and all its possible parameters. Commands are displayed in lowercase bold; variable parameters (those for which you substitute a value) are displayed in lowercase italics; constant parameters are displayed in lowercase bold. The brackets indicate items that are optional.

  Example: **del** [*drive***:**] [*path*] *filename* [**/p**]

- *Command lines* consist of a command and may include one or more of the command's possible parameters. Command lines are presented in the Courier New font.

  Example: `del c:\myfile.doc`

- *Screen text* is text that appears on the screen of your monitor or display. It can be a system message, for example, or it can be text that you are instructed to type as part of a command (referred to as a *command line*). Screen text is presented in the Courier New font.

  Example: The following message appears on your screen:

  ```
  No boot device available
  ```

  Example: "Type `md c:\programs` and press <Enter>."

- *Variables* are placeholders for which you substitute a value. They are presented in italics.

  Example: DIMM*x* (where *x* represents the DIMM socket designation).

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CHAPTER 1
Installing the Dell™ PowerVault™ 56F 16-Port Fibre Channel Switch

This chapter discusses the following aspects of installing the Dell PowerVault 56F 16-Port Fibre Channel switch:

- Unpacking the switch
- Power requirements
- Site location
- Installing a GBIC module with power on
- Fibre channel cable connections
- Front panel controls
- Ethernet connections
- Verifying power-on self-test (POST)

Unpacking the PowerVault 56F Switch

NOTE: Some items may be shipped as part of an over-pack.

While unpacking the switch, check to make sure the following items are included:

- PowerVault 56F switch unit
- Power cord
- Five copper gigabit interface converter (GBIC) modules or four optical and one copper GBIC modules, depending on the switch configuration
- *User's Guide*, this *Installation and Troubleshooting Guide*, and the *Switch Manager Guide* (if ordered)
- Installation kit, which includes rubber mounting feet

Save packing materials in case you need to return the switch.

Power Requirements

Switch power connection is by way of a switched connector on the switch's front right side, as shown in Figure 1-1. The switch power requirements are as follows:

- Properly wired, grounded outlet
- Input voltage: 85–265 volts alternating current (VAC)
- Total power: Up to 155 watts (see Appendix A, "Specifications" in the *User's Guide*)
- Input line frequency: 47 to 63 hertz (Hz)

The switch has an autoranging power supply that automatically accepts voltages within its ranges.

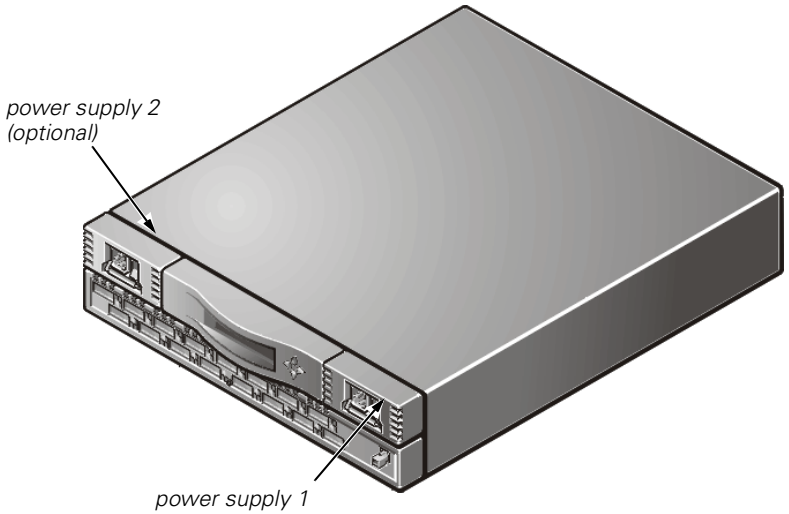


Figure 1-1. PowerVault 56F Switch Front View

NOTE: The switch meets International Electronic Commission (IEC) 801-5 surge voltage requirements; however, there is no other provision for surge protection built into the switch's power supplies. An installation should include normal provisions to ensure clean power.

Site Location

The switch should be installed in a secure or limited access site to control unauthorized access to the switch's cabling and power connections.

NOTE: Do not block the front or back air vents. The switch must have clear access to ambient air for cooling.

Installing a GBIC Module With Power On

Each switch supports sixteen universal ports and their interchangeable GBIC modules. The GBIC module uses a standard subscriber connector (SC) or high speed serial data connectors (HSSDC).

You can insert a GBIC module while the switch is operational (power on).

NOTICE: The GBIC module is keyed so it can be inserted into the interface card in only one way. Do not force the insertion if the GBIC module does not slide in easily.

To install an IBM® GBIC module into an interface card, perform the following steps:

1. Ensure that the locking bar on the front of the IBM GBIC module is to the right side of the GBIC.
2. Insert the GBIC module until its connector is firmly seated into the appropriate port.
3. When firmly seated, lock the GBIC module in the slot by pushing the locking bar to the left side of the GBIC. *Do not* force the locking bar; reseat if necessary.

To install a non-IBM GBIC module into an interface module, perform the following steps:

1. Insert the GBIC module into the appropriate port.
2. Press the GBIC module until its connector is firmly seated.

Fibre Channel Cable Connections

All network cable connections are on the switch's front panel. All recommended cabling supports the switch's 1 gigabyte per second (Gbps) transfer rate, as shown in Table 1-1.

Table 1-1. Cabling Connections

Cable type	Cable Specification	Maximum Run Length	GBIC Module
Short-wave laser (SWL) Fiber Optic	• Duplex SC plug connectors • Multimode fiber • 50 or 62.5 micrometers (µm) core diameter • 125 µm cladding diameter duplex cable	500 meters (m) (1641 feet)	770-850 µm without open fiber control (non-OFC)

Table 1-1. Cabling Connections *(continued)*

Cable type	Cable Specification	Maximum Run Length	GBIC Module
Long-wave laser (LWL) Fiber Optic	• Duplex SC plug connectors • Single mode fiber • 9 µm core diameter • 125 µm cladding diameter duplex cable	10 kilo-meters (32,820 feet)	1270-1350 µm without open fiber control (non-OFC)
Copper	• Impedance controlled for 150-ohm differential systems • Low skew, shielded-quad, 150-ohm cable • Polarized interface • HSSDC receptacle	12 m (38 feet)	• SCA2 printed circuit board (PCB) interface • HSSDC input/output (I/O)

Various lengths of copper and shortwave optical cables are available from Dell. These cables have been designed and approved by Dell. Dell recommends the use of these cables to ensure the proper operation of the switch.

Fiber cable connections are made to the switch's front panel using standard dual SC plug connectors as shown in Figure 1-2.

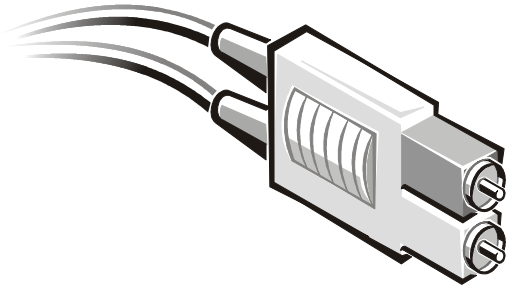


Figure 1-2. Dual SC Fiber-Optic Plug Connector

The connectors are indexed and must be inserted into the GBIC module's connector in proper alignment. In most cases, one of the two connector plugs is a different color to aid in proper connector alignment.

CAUTION: Remove the protective plug from the GBIC module. Do not force the fiber-optic plug into the GBIC module as you may damage the connector, the GBIC module, or both. Make certain the fiber surface is free of dust or debris before inserting the connector into the GBIC module.

Front Panel Controls

You can use the front panel controls for initial configuration of the switch including setting up the Internet protocol (IP) address on a new switch for accessing the remote management features. The panel also has a liquid crystal display (LCD) that can be used to monitor switch status. For more information, see "Managing Through Front Panel Buttons" in Chapter 3.

Ethernet Connection

Connecting an existing Ethernet 10/100BASE-T local area network (LAN) to the switch by way of the front panel RJ-45 connector gives access to the switch's internal Simple Network Management Protocol (SNMP) agent, allowing remote Telnet and web access for remote monitoring and testing.

NOTES: The connection is only for Telnet, SNMP agent, and the web-based server access. No Fibre Channel services are available by way of this connection.

Only one Telnet session can be opened at a time.

Verifying Power-On Self-Test (POST)

When powering on a switch, the switch conducts a series of diagnostic tests including:

- Memory test
- Port register test
- Central memory test
- RDRAM test

POST behaves differently depending on the boot method. A power cycle (power-off and power-on) is considered a cold boot. All other boots from a powered-on state (per reboot, panic, and so on) are considered to be warm boots.

POST execution per cold boot executes the long version of the memory test. POST execution per warm boot executes a shorter version of the memory test. Boot time with POST varies depending on the boot method.

As the POST successfully performs each of the tests, the message `Passed` is displayed using the **Telnet** command.

After the switch completes the POST, the GBIC module returns to a steady state from the flashing states shown during the tests.

If an amber GBIC module light is displayed, there was a failure on that port during POST. See "Power-On Diagnostics" in Chapter 5 for more information.

CHAPTER 2
PowerVault 56F 16-Port Fibre Channel Switch Topologies

This chapter discusses some key factors affecting fabric performance, including the following:

- Fabric elements
- Sample fabric topologies

Fabric Elements

Each fabric is unique and the elements that determine the fabric's structure include:

- Class of frames in the fabric
- Type of host adapters connected to the fabric
- Bandwidth requirements supported by the fabric
- Topology of the switches in the fabric
- Requirements for redundancy and fault tolerance

Regardless of the topology used, the switch's extremely low message latency minimizes fabric message handling time that results in a high-performance fabric.

Routing Cost

All Inter Switch Links (ISLs) have a default cost of 1000. The cost of a path between any two switches in the fabric is the sum of the costs of all ISLs. The switches that comprise the fabric always choose the lowest cost path through the fabric to forward frames from the source switch to the destination switch.

When constructing a multiswitch configuration, called a cascaded fabric, a frame entering the fabric may pass through eight switches before exiting the fabric. The switch does not enforce the eight-switch limit. It is your responsibility to ensure that the seven-hop limit is not exceeded. The **uRouteShow** command provides

information regarding the cost of the shortest path to another switch from which you can derive the number of hops. The cost should not exceed 7000 (7 x 1000).

A fabric using Dell switches in cascaded topologies should be configured to deliver the required bandwidth and fault tolerance with all connections made within the seven-hop maximum limit.

NOTE: The maximum number of hops supported in a Dell Storage Area Network (SAN) configuration may be less than seven. This number is determined by the features of the connected devices.

Cascading and Configuring Switches

Cascaded topologies using multiple switches give switching system designers a powerful, flexible set of resources to create high-performance, robust storage area networks (SAN), or data center backbone.

NOTES: Except for unique identifiers such as the switch name, domain name, and IP address, all switches in a fabric must have the same firmware configuration. Switches that are configured differently are isolated from the fabric.

Live switches may be cascaded; however, the domain IDs must be different. If the domain IDs of any of the switches are identical, the fabric segments and a fabric segment error is reported. You can resolve this problem by rebooting one of the switches with a conflicting domain ID.

To be compatible with the PowerVault 50F switch, the VC Encoded Address mode is enabled by default on the PowerVault 56F switch. In the event that you need to upgrade the firmware on your PowerVault 56F switch refer to the **firmwareDownload** command found later in this chapter.

Universal Ports

All 16 switch ports are universal supporting F_, FL_, and E-port modes of operation. They are designed to automatically select the optimum mode.

Public Operation

In public operation, all loop devices are accessible to all other fabric-connected devices and loop devices within the fabric. The loop devices behave the same as devices attached directly to the fabric.

Private Operation

Dell's FL_Port translative mode allows private devices and fabric-attached devices on a local loop to communicate with each other. Fabric-attached devices can be either N_Ports attached to G_Ports or public NL_Ports attached to other FL_Ports.

Logically, private and fabric-attached devices that communicate to a loop appear to be devices on the same loop as the private devices. Each fabric-attached device uses an unassigned AL_PA from the local loop. When private devices on a local loop and

fabric-attached devices communicate, the FL_Port automatically translates between private and public addresses.

The FL_Port translative mode supports up to 32 fabric-attached devices (one is reserved for the fabric) appearing on each local loop of private devices, subject to the limit of 126 devices on a loop (the total of private and fabric-attached devices).

Private devices are registered to the Simple Name Server (SNS), so the fabric-attached devices can query SNS for their addresses and initiate communication.

NOTE: Loops may contain any combination of public or private loop devices.

Sample Fabric Topologies

The following fabric topology samples show several different conceptual topology models. Each installation has a unique topology that is determined by the characteristics of the connected devices and your performance objectives.

Single-Switch Fabric

The simplest fabric consists of a single-switch topology as shown in Figure 2-1.

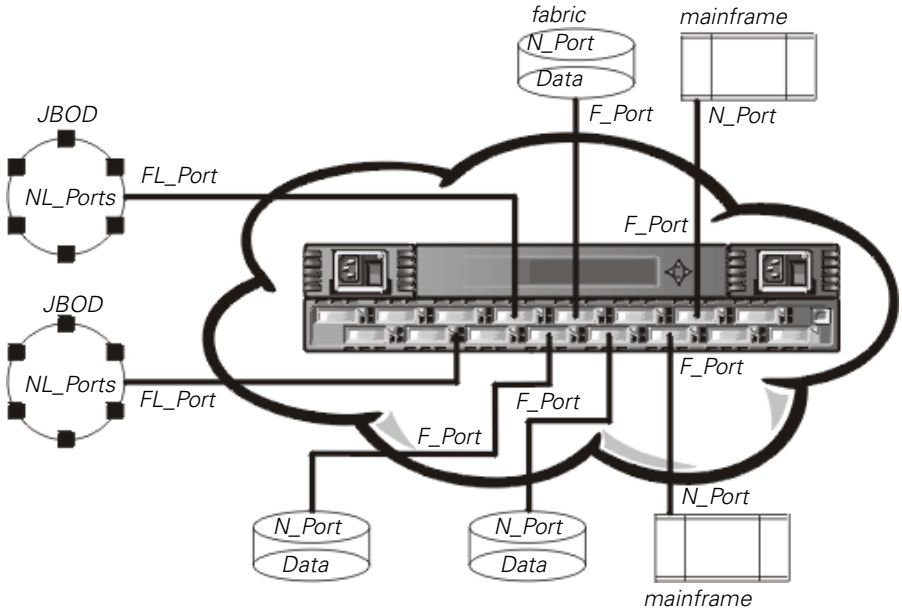


Figure 2-1. Single-Switch Topology Sample

Figure 2-1 shows the switch's F_Ports and FL_Ports and the corresponding N_Port and NL_Port connections on the device side. The switch connections are shown as they would be in a physical installation. Functionally, the switch becomes a fabric with every device connected to every other device by the fabric.

Each connection is full duplex with transmissions up to 1 Gbps simultaneously, in both directions, between the fabric and fabric-connected devices.

Two-Switch Sample Topology

The two-switch topology increases the number of connections and aggregate fabric bandwidth, as shown schematically in Figure 2-2. The switches are shown physically connected although the connections are transparent in the fabric. Functionally, the devices appear to be connected together directly.

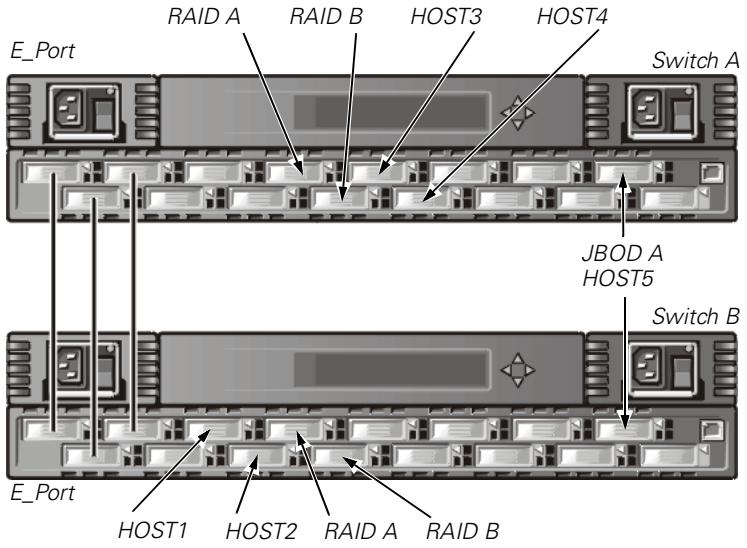


Figure 2-2. Fabric Topology Sample With Three Connections Between Two Switches

When a fabric is initiated, or when a new switch is added to the fabric, the switches determine a least-cost path for each destination switch. This is done dynamically each time the fabric configuration changes and the results are stored in the switch's internal routing tables.

NOTE: After a path has been determined, it is not rerouted, even though traffic volume may change over time, for each path to maintain in-order delivery. If the link fails, the path is rerouted.

Increasing Local Bandwidth Within the Fabric

In Figure 2-2, three connections are shown between Switch A and Switch B. This connection gives an aggregate bandwidth of six Gbps—in other words, three 1-Gbps, full-duplex connections. Increasing bandwidth between switches is done by adding additional connections between the switches.

In addition to the bandwidth, redundant connections between the switches in Figure 2-2 provide a high-bandwidth, fault-tolerant fabric.

CHAPTER 3
Managing the PowerVault 56F 16-Port Fibre Channel Switch

This chapter contains general information and examples on managing and monitoring the PowerVault 56F 16-Port Fibre Channel switch. The following topics are discussed:

- Compatibility with PowerVault 5*x*F series hardware
- Switch management methods
- Managing through front panel buttons
- Managing using the **Telnet** command
- Managing with Simple Network Management Protocol (SNMP) under Dell OpenManage™ systems management software and the PowerVault 56F switch manager
- Managing with the Dell PowerVault switch manager

NOTE: You must assign an Internet protocol (IP) address to the switch through the front panel controls before you can access the remote management methods.

Compatibility With PowerVault 5xF Series Hardware

The PowerVault 56F switch interoperates with the PowerVault 5*x*F switches. To be compatible with the PowerVault 50F switch, the PowerVault 56F switch should be configured to a specific addressing mode designated as VC encoded Address mode (also known as *compatibility mode*). This mode is enabled by default on all PowerVault 5*x*F switches.

When using this compatibility mode, the maximum switch count in the fabric is limited to 32 as opposed to a maximum of 239, and the number of multicast groups is reduced from 256 to 31.

NOTE: The maximum number of interconnected switches that are supported in Dell configurations may differ depending on device features. Please refer to your Dell PowerVault System Storage Area Network (SAN) Installation and Troubleshooting Guide for the currently supported configuration.

Comparing Switch Management Methods

Before changing any of the factory default settings, become familiar with the operations described in this chapter including both the switch's functions and interactive characteristics.

There are several access methods for managing a switch. Table 3-1 summarizes the various management methods.

Table 3-1. Comparison of PowerVault 56F Switch Management Methods

Method	Description	Local	Out-of-band (Ethernet)
Telnet commands	Managed remotely using **Telnet** commands	No	Yes
Managing with SNMP	Managed remotely using SNMP	No	Yes
PowerVault 56F Fibre Channel switch manager	Managed remotely though Web	No	Yes
Front panel controls	Front panel interface	Yes	No

Figure 3-1 shows the various methods and communication paths for accessing switch management information.

*NOTE: Dell recommends the switch be managed remotely using the **Telnet** command or web management (PowerVault Switch Manager).*

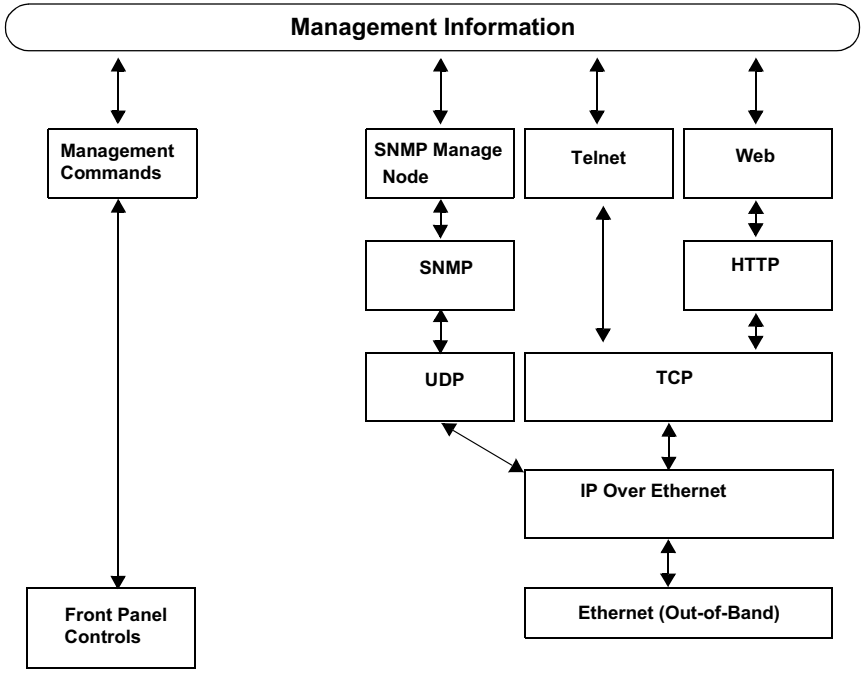


Figure 3-1. Switch Management Methods

Managing Through Front Panel Buttons

The following sections describe the various buttons available to you for switch management.

Control Buttons

Table 3-2 lists the primary control button functions. The function of the button changes depending on the menu level. Buttons either control navigating through the menus or incrementing/decrementing numeric values.

Table 3-2. Control Buttons

Control Button	Description
<Down>	<Down> scrolls down the command list, or if the user is changing a numeric display it decrements the displayed value.
<Up>	<Up> scrolls up the command list, or if the user is changing a numeric display, pressing this button increments the numeric value.

Table 3-2. Control Buttons *(continued)*

Control Button	Description
<Tab>	<Tab> tabs through multiple options. When displaying a menu item, pressing <Tab> reverses through previous commands and, if pressed repeatedly, turns off the front panel display.
<Enter>	<Enter> accepts the input and executes the selected function. To abort an entry, pressing <Tab> navigates to the previous item.

When entering a number, the <Up> and <Down> buttons start in the slow mode and change to the fast mode if either button is held down. Most numbers go to a maximum of 255; for a large number, it may be faster to use the <Down> button.

Activating Menu Display

The switch's front panel display is normally not illuminated. Pressing the front panel buttons activates the display. If no command is issued, the display turns off after 30 seconds.

Menus

The following menus in the Table 3-3 are controlled using the front panel buttons.

Table 3-3. Menus and Menu Options

Configuration Menu	Operation Menu	Status Menu	Test Menu
• Ethernet IP Address • Ethernet Subnetmask • Fibre Channel IP Address • Gateway Address • Domain • BB_credit • R_A_TOV • E_D_TOV • Operating Mode — Non-SCSI Tachyon Mode — Disable Device Probing — VC Encoded Address Mode — Disable Transla-tive Mode — Per-Frame Route Priority • VC Link Ctl • VC Class 2 • VC Class 3 • VC Multicast • VC Priorities • Always send RSCN? • Send FAN Frames? • Frame Collection • Reset to Default	• Switch Offline • Switch Online • Port Disable • Port Enable • Close Telnet Session • Reboot	• Switch Name • Worldwide Name • Firmware Version • Current Date • Booted At • Firmware Date • Flash Date • Boot Prom Update • Up Time • Powered Time • Port Type • Module Type • Port Throughput • Temperature • Error Log • Licenses	• Switch Offline • Switch Online • Memory Test • Port Register Test • Central Memory Test • CMI Conn Test • CAM Test • Port Loopback Test • Cross Port Test • Spin Silk Test • SRAM Data Retention Test • CMEM Data Retention Test • Display Test • Push Button Test

Commands

Table 3-4 shows the front panel commands and their equivalent **Telnet** command.

Table 3-4. Front Panel and Telnet Commands

Menu	Front Panel	Telnet Command	Default
Configuration	Ethernet IP Address	ipAddrSet	10.1.2.3
	Ethernet Subnetmask	ipAddrSet	None
	Fibre Channel IP Address		None
	Fibre Channel Subnetmask		None
	Gateway Address		None
	Domain	configure	0
	R_A_TOV	configure	16 (G_Port) - 0 (FL_Port)
	E_D_TOV	configure	10,000
	Operating Mode	configure	2000
	Non-SCSI Tachyon Mode	configure	0
	Isolated Operation	configure	0
	Disable Device Probing	configure	0
	VC-Encoded Address Mode	configure	0
	Disable Translative Mode	configure	0
	Per-Frame Route Priority	configure	0
	VC Link Ctl	configure	2
	VC Class 2	configure	3
	VC Class 3	configure	7
	VC Multicast	configure	0,1,2,2,2,2,3,3
	Frame Collection	configure	Pilling
	Reset to Default	configDefault	N/A
Operation	Switch Offline	switchDisable	N/A
	Switch Online	switchEnable	N/A
	Port Disable	portDisable <*port#*>	N/A
	Port Enable	portEnable <*port#*>	N/A
	Close **Telnet** Session	logout	N/A
	Reboot	reboot	N/A
Status	Switch Name	switchShow	N/A

Table 3-4. Front Panel and Telnet Commands *(continued)*

Menu	Front Panel	Telnet Command	Default
	Worldwide name	switchShow	N/A
	Firmware Version	version	N/A
	Current Date	date	N/A
	Booted At	version	N/A
	Firmware Date	version	N/A
	Flash Date	version	N/A
	Boot From Date	version	N/A
	Up Time	uptime	N/A
	Powered Time	uptime	N/A
	Port Type	switchShow	N/A
	Module Type	switchShow	N/A
	Port Throughput	portPerfShow	N/A
	Temperature	tempShow	N/A
	Error Log	errShow	N/A
	Licenses	licenseShow	N/A
Text	Switch Offline	switchDisable	N/A
	Switch Online	switchEnable	N/A
	Memory Test	ramTest	N/A
	Port Register Test	portRegTest	N/A
	Central Memory	centralMemoryTest	N/A
	CMI Conn Test	cmiTest	N/A
	CAM Test	camTest	N/A
	Port Loopback Test	portLoopbackTest	N/A
	Cross Port Test	crossPortTest	N/A
	Spin Silk Test	spinSilk	N/A
	SRAM Data Retention Test	sramRetentionTest	N/A
	CMEM Data Retention Test	cmemRetentionTest	N/A
	Display Test	N/A	N/A
	Push-Button Test	N/A	N/A

Configuration Menu

Configure the switch using the **Configuration Menu**. Pressing <Enter> while in the **Configuration Menu** selects the option to choose commands. The following sections contain the Configuration Menu options and give detailed information about each configuration command.

*NOTE: After changing any of the following menus from the front panel or **Telnet** connection, you must reboot the switch for the changes to take effect.*

Ethernet IP Address

Pressing <Enter> with Ethernet IP address selected displays the switch's Ethernet IP address.

The switch's default IP address is a temporary address derived from the switch's WWN. Enter a valid IP address.

Entering an IP Address

To enter an IP address, perform the following steps:

1. Use <Up> and <Down> to increase or decrease the displayed value. The underlined cursor indicates the numbers to modify.

   When entering a number, <Up> and <Down> start in the slow mode and move to the fast mode if the button is held down. The numbers go to a maximum of 255 and wraps to zero; for a large number, it may be faster to use the <Down> button.

2. After entering a number, press <Tab> to move the cursor to modify the next field.

3. After setting the IP address, press <Enter> to store the value.

Ethernet Subnetmask

Pressing <Enter> while **Ethernet Subnetworkmask** is selected displays the Ethernet Subnetmask address.

The default subnet mask value is **none**. Refer to the network administrator for the appropriate subnet mask.

Enter the switch's subnet address by using <Up> and <Down> to increase or decrease the displayed value. The numbers with the underline cursor is the group to modify.

Fibre Channel IP Address

Pressing <Enter> with **Fibre Channel IP address** selected displays the Fibre Channel IP address.

The default Fibre Channel IP address is `0.0.0.0`. Enter a valid IP address.

Updating the Fibre Channel IP Address

To enter an IP address, perform the following steps:

1. Use <Up> and <Down> to increase or decrease the displayed value. The underlined cursor indicates the numbers to modify.
2. After entering a number, press <Tab> to move the cursor to modify the next field.
3. After setting the Fibre Channel's IP address, press <Enter> to store the value.

NOTICE: Do not set the Fibre Channel IP address to the same address as the Ethernet IP address - two different address are required.

Fibre Channel Subnetmask

Pressing <Enter> while **Fibre Channel Subnetmask** is selected displays the Fibre Channel's subnet mask address.

The default subnet mask value is **none**. Consult your network administrator for the appropriate subnet mask

Enter the switch's Fibre Channel Subnetmask by using <Up> and <Down> to increase or decrease the displayed value.

Gateway Address

Pressing <Enter> while **Gateway address** is selected displays the fibre channel's gateway address.

The default gateway address is `0.0.0.0`. You must enter a valid gateway address, if required.

Entering the Gateway Address

To enter a gateway address, perform the following steps:

1. Use <Up> and <Down> to increase or decrease the displayed value. The underlined cursor indicates the numbers to modify.
2. After entering a number, press <Tab> to move the cursor to modify the next field.
3. After setting the Fibre Channel's IP address, press <Enter> to store the value.

Domain

The domain number uniquely identifies the switch in a fabric. This switch ID is normally automatically assigned by the switch and may be any value between 1 and 239. If VC-Encoded Address Mode is in effect, then the values are between 0 and 31. You may also assign this number manually.

BB_credit

Pressing <Enter> while **BB_credit** is selected displays the number of buffers available to the host.

The number displayed represents the number of buffers, from 1 to 16, available to the host. For a complete description of buffer-to-buffer credit, refer to the industry specification "Fibre Channel Physical and Signaling Interface (FC-PH)."

R_A_TOV

Pressing <Enter> while **R_A_TOV** is selected displays the Resource Allocation Time Out Value (R_A_TOV).

The R_A_TOV is adjustable in 1-second increments using front panel controls, but its value is displayed in milliseconds. This variable works with the variable E_D_TOV to determine the switch's actions when presented with an error condition. Allocated circuit resources with detected errors are not released until the time value has expired. If the condition is resolved prior to timing out, the internal time out clock resets and waits for the next error condition.

The range is 1 to 120 seconds.

NOTE: The set value must be larger than the set value for the Error Detect Time Out Value.

E_D_TOV

Pressing <Enter> while **E_D_TOV** is selected displays the Error Detect Time Out Value (E_D_TOV).

The E_D_TOV is adjustable in 1-second increments using the front panel controls, but its value is displayed in milliseconds.

*NOTE: Use the **flashSet** command during a **Telnet** session to set the E_D_TOV or R_A_TOV (in milliseconds) for values other than whole seconds.*

This timer is used to flag a potential error condition when an expected response is not received (an acknowledgment or reply in response to packet receipt, for example) within the set time limit. If the time for an expected response exceeds the set value, then an error condition is met.

The range is 1 to 60 seconds.

NOTE: The set value must be less than the set value for the Resource Allocation Time Out Value.

Operating Mode

The operating modes are determined by the host adapter. The six operating modes for the switch are shown in Table 3-5:

Table 3-5. Operating Mode Definitions

Mode	Description
Non-SCSI Tachyon Mode	When set, multiple sequences from different sources are interleaved to Tachyon-based controllers at Sequence boundaries rather than at frame boundaries, resulting in better performance from Tachyon-based controllers.
Isolated Operation	Setting this mode isolates the switch from the rest of the fabric.
Disable Device Probing	When this is set, devices that do not register themselves with the Name Server will not be present in the Name Server data base.
VC-Encoded Address Mode	When this mode is set, frame source and destination addresses utilize an address format compatible with some first-generation switches.
Disable Translative Mode	This setting is only relevant if VC Encoded Address Mode is also set. When set, this maintains explicit address compatibility with the PowerVault 50F switches.
Per_frame Route Priority	In addition to the 8 virtual channels used in frame routing priority, support is also available for per-frame based prioritization when this value is set. When set, the virtual channel ID will be used in conjunction with a frame header to form the final virtual channel ID.

The administrator determines the adapter in use, then sets the switch for the corresponding operating mode.

Virtual Channels

The switch provides the ability to tune the switch in a specific application.

The first two virtual channels are reserved for the switch's internal functions and are not available.

NOTE: The default virtual channel settings are optimized for switch performance in most applications. For some applications, changing from default values may improve performance. If changes are made without fully understanding these parameters, the switch performance will be degraded considerably.

VC Link Ctl

Pressing <Enter> while **VC Link Ctl** is selected displays the virtual channel link control channel.

The Virtual Channel Link Control changes the link control channel. There are two options: 0 and 1.

Option 0 forces data receipt acknowledgments on Class 2 channels to be sent back on the data channel. This traffic consumes a portion of the available data channel bandwidth.

Option 1 allows data receipt acknowledgment packets to use the VD-1 (internal switch traffic channel) which frees additional bandwidth in the data channel, and transfers the data receipt traffic load to the switch's internal traffic channel.

VC Class 2

Pressing <Enter> while **VC Class 2** is selected displays the virtual channel 2 setting.

You can select the default channel of 2, but you can also select virtual channel 3, 4, or 5.

VC Class 3

Pressing <Enter> while **VC Class 3** is selected displays the virtual channel 3 setting.

You can select the default channel as 3, but you can select virtual channel 2, 4, or 5.

VC Multicast

Pressing <Enter> while **VC Multicast** is selected displays the virtual channel multicast channel.

You may change the multicast transmission channel to either virtual channel 6 or 7. Verify that the multicast channel has the frame class priority set to the frame class of the expected traffic.

VC Priorities

Pressing <Enter> while **VC Muticast** is selected displays the priorities assigned to each of the switch's virtual channels. Positions 1 and 2, starting at the left of the display, are fixed and display 0 or 1.

The first position, a 0 ,shows and indicates that this virtual channel, assigned to handle internal switch traffic, has the highest priority. This priority value cannot be changed by the user.

The second position, indicated by a 1, shows the priority assigned by the virtual channel link control as described in the "VC Link Ctl" section.

The third through eighth positions can have only a 2 or a 3 indicating that the channel gives priority to either Class 2 frame traffic or to Class 3 frame traffic.

Frame Collection

Pressing <Enter> while **Frame Collection** is selected displays a frame collection method.

This command specifies two frame collection methods, bundle and piling. Using bundling, frames are separated in different queues based on source/destination pairs. Using piling, frames are accumulated per destination AL_PA if NL_Ports can handle multiple frames in a loop. Additionally, piling can minimize loop traffic by reducing overhead and increases the loop efficiency.

To set, press <Tab> for Bundle or <Enter> for Piling.

Reset to Default

Pressing <Enter> while **Reset to Default** is selected displays a **Yes** or **No**.

Clicking **Yes** and then pressing <Enter> causes all values in the Configuration Menu to reset to default conditions. Once the Ethernet IP address and the switchname are changed, they are not reset to default values.

NOTE: Resetting the switch to default causes all configuration settings, names, and passwords entered to be reset to default settings.

Port Disable

Pressing <Enter> while the **Port Disable** message is selected displays a submenu to select the port to disable.

Pressing <Enter> while a selected port is displayed disables the port. The LED associated with the port changes from green to amber indicating the selected port has been disabled.

Port Enable

Pressing <Enter> while the **Port Enable** message is displayed opens a submenu where you select the port.

Pressing <Enter> while the selected port is displayed disables the port. The LED associated with the port changes from green to amber indicating the selected port has been enabled. When FL_Ports are enabled, the port initializes the loop attempting to be the master.

Close Telnet Session

Pressing <Enter> while the **Close Telnet Session** message is displayed causes the **Telnet** session to close immediately.

Reboot

Pressing <Enter> while the **Reboot** message is displayed causes the switch to reboot immediately.

Rebooting the switch causes it to immediately exit all current processes and states, and start the POST process. Exercise caution using the reboot command on a switch connected to the fabric.

Pressing <Enter> while the **Reboot** message is selected displays **Yes** or **No**.

Clicking **Yes** causes the switch to immediately reboot. Clicking **No** or pressing <Tab> exits this function.

Status Menu

You can retrieve information on the switch using the Status Menu. This menu is informational only; you cannot make changes to the switch's status from this menu.

Switch Name

Pressing <Enter>, while **Switch Name** is selected displays the switch name. An example switch name might be `sw15`.

Worldwide Name

Pressing <Enter>, while **Worldwide Name** is selected displays the switch's world wide name. An example switch name might be `10:0:-:60:69:0:0:e`.The switch's world wide name is a unique identifier for each switch and it is assigned by the manufacturer. A numbering scheme administered globally assures that this world wide name is unique.

Firmware Version

Pressing <Enter> while **Firmware Version** is selected displays the version of firmware installed. An example firmware version name might be `v1.4`, indicating firmware version 1.4.

Current Date

Pressing <Enter> while **Current Date** is selected displays the switch's current date. An example date might be `Mar 10 08:48:29 CST 2000`.

Booted At

Pressing <Enter> while **Booted At** is selected displays the switch's boot time. An example boot time might be `Oct 15 08:48:29 CST 2000`.

Firmware Date

Pressing <Enter> while **Firmware Date** is selected displays the date of the switch's firmware. The firmware date reflects the date code of the current executing firmware on the CPU. Flash Date reflects the firmware date in flash memory. These dates may not match if the flash memory has been updated with new firmware but the switch has not yet been rebooted. When the switch is rebooted, the flash code becomes the executing CPU code, both dates match.

An example firmware date might be `Jul 06 04:48:29 CST 1991`.

Flash Date

Pressing <Enter> while **Flash Date** is selected displays the date and time of the last flash firmware update. If you upgrade the firmware in flash memory with a different firmware version, the date the new firmware was entered is displayed.

Use this date to quickly establish the date the firmware was updated.

Boot Prom Update

Pressing <Enter> while **Boot Prom Update** is selected displays the date and time the boot prom was manufactured. Use this date to establish the boot prom version.

Up Time

Pressing <Enter> while **Up Time** is selected displays the time the switch has been up since the last reboot of the switch.

Powered Time

Pressing <Enter> while **Powered Time** is selected displays the time the switch has been powered on.

Port Type

Pressing <Enter> while **Port Type** is selected displays the status of each port on the switch. The ports start with the first port on the switch which is the port in the top left position when the ports are viewed from the switch's front panel. An example status might be:

```
EFEG GFGF xxxx xxxx N
```

The definitions assigned in the example above are:

- **E** — E_Port is an interswitch expansion port used to connect to an E_Port of another switch to build a larger switch fabric.
- **F** — F_Port, the fabric access port, is used to connect an N-Port and is used within the switch fabric for control and management.
- **L** — FL_Port is a switch port connected to an arbitrated loop.
- **G** — G_Port is a generic port that can operate either as an E_Port or an F_POrt but has not yet assumed a specific function in the fabric.
- **U** — U_Port is a generic port that can operate as an E_Port, F_Port, or FL_Port but has not yet assumed a specific function in the fabric.
- **N** — N_Port is used within the switch itself for internal switch control traffic. It does not have an external physical port.
- **x** — Indicates no interface nodule is installed.

Module Type

Pressing <Enter> while **Module Type** is selected displays the type of GBIC module installed in a port. The module options are:

- **L** — long wave length
- **S** — short wave length

- **C** — copper

Port Throughput

Pressing <Enter> while **Port Throughput** is selected displays the port throughput on the switch. The throughput number represents the number of bytes received plus the number of bytes transmitted per second and is displayed in bytes/second (B/s), kilobytes/second (KB/s) or megabytes/second (MB/s). You can select different ports using <Up> and <Down>, from port 0 to port 15 and all ports, and is used to monitor a single or the aggregate of all port(s) performance.

Temperature

Pressing <Enter> while **Temperature** is selected displays the temperatures at the temperature sensors on the motherboard. The temperature readings are shown at a rate of one reading per second on the front panel. Reading obtained during a **Telnet** session are single readings made at command execution.

Error Log

Pressing <Enter> while **Error Log** is selected displays the following information:

- Error number (01-64)
- Date and time of the last occurrence each error type was sensed
- Total number of occurrences of each error type
- Error type
- Error level for each error type, with error level 1 being the most critical; error level 2, error level 3, and warning, are the other error levels displayed.
  - **0:** Panic (When this level is reached, the switch automatically reboots and the display no longer shows the error.)
  - **1:** Critical
  - **2:** Error
  - **3:** Warning
  - **4:** Info
  - **5:** Debug

  An example status might be:

```
01 Feb 12:08:48:29 (23)

Err SENSOR-FAILED-3
```

  In the example, the first line shows that this is the first error (01) found on Feb 12 08:48:29 and had (23) occurrences. The second line shows that the error type is SENSOR-FAILED with a sensitivity level of 3 (warning).

NOTE: The error occurrences count, shown in parentheses at the end of the first line, does not appear until the error occurrence is higher than one.

Test Menu

The tests available from the Test Menu are part of the diagnostic and fault isolation capabilities.

Managing By Way of Telnet

To make a successful **Telnet** connection to a switch, the following information is required:

- Switch name or IP address
- Username
- Password

NOTES: You must assign an IP address to the switch through the front panel controls before you can access the remote management methods.

Consult with the local network system administrator for the IP address that is assigned to the switch.

Default Username

Each Default Username has a security level associated with it. Username 3 is the least privileged and the security level goes up to Username 0, which is the most privileged, as described in Table 3-6.

Table 3-6. Default Username

Default User Name	Description
user (Username 3)	Gives users access to any commands that do not change a switch state, such as version. This level is the recommended level for monitoring switch activity.
admin (Username 0)	Gives users access to all commands in the **Help** menu. Most switch administration is performed at this level.

The system administrator may assign different usernames than those listed, if desired. The user at a particular security level, however, has the same privileges regardless of the name assigned.

Changing Passwords

The initial default password for all usernames is **password**. Change the default passwords during installation to meet the fabric's security requirements.

To change user passwords, perform the following steps:

1. Log in as **admin**.
2. Type the command `passwd`.

3. Each username (admin, user, other) is displayed in sequence, allowing the administrator to modify each password and name.

4. Enter a password or name while a username is displayed to replace the existing password or name.

NOTE: If you lose the password, contact Dell for technical assistance.

Managing With SNMP Under Dell OpenManage Systems Management Software and the PowerVault 56F Switch Manager

NOTICE: SNMP settings on the switch pose a security risk. When setting up the SNMP settings for the PowerVault 56F, the user must set up the community name and trap recipients IP address. The first three community names have read/write (rw) permissions, whereas the last three have read-only (ro). This means that the default Secret Code, OrigEquipMfr, and private communities could pose a security breach. Anyone knowing the default community names of the switch could perform SNMP sets on the switch and change its configuration values.

NOTICE: Dell recommends that you use one of the "ro" communities to set up your trap community and trap recipients IP address. Also, the administrator of the switch may want to rename the default communities to a unique secure name.

The resident SNMP manage node allows remote switch management by way of IP over Ethernet and Fibre Channel interfaces.

Dell OpenManage systems management software integrates the PowerVault 56F switch through HP OpenView Network Node Manager Special Edition (NNM SE) system management software in a Microsoft® Windows NT® environment. You can use Dell OpenManage systems management software to manage this device. If you have a PowerVault 56F switch connected in your network, it is automatically discovered as a node in the node submap of HP OpenView NNM SE. To launch the PowerVault 56F Switch Management Application, double-click the discovered FC-switch node to access the expanded node submap, and then double-click the **Switch Management Application** icon.

Refer to your *Dell OpenManage Hardware Instrumentation Package User's Guide* and the *HP OpenView Network Node Manager Special Edition User's Guide* for more information on Dell OpenManage systems management software.

The switch's managed node supports the following:

- SNMPv1 manager and SNMPv2c
- Command line utilities to provide access to and control of the managed node

- MIB-II system group, interface group, and SNMP group
- Fabric Element MIB
- Vendor-Specific MIBs
- Standard Generic traps
- Enterprise-Specific traps

NOTES: You must configure the management platform's IP address as a trap recipient so it will be discovered by that management platform. HP OpenView NNM SE version 3 and above have MIB and auto discovery support for the switch.

While the switch may be managed using a MIB browser, Dell recommends using the web-based PowerVault 56F Switch Manager or using the ***Telnet*** *command.*

SNMP Transports

The SNMP manage node residing on the embedded processor supports UDP/IP over the Ethernet interface or any FC-IP interface (see Table 3-1). This transport provides an immediate Plug and Play support for the switch once the IP address has been assigned.

Fabric Element MIB Support

The following five object groups are defined and supported:

- Configuration group
- Operation group
- Error group
- Accounting group
- Capability group

The agent supports all groups, except the accounting group, which is better supported in the Fibre Channel Port (FCP) group of the vendor-unique MIB.

PowerVault 56F Switch Vendor-Unique MIB

The following five groups of MIBs are defined and supported:

- PowerVault 56F system group
- Fabric group
- SNMP manage node configuration group
- FCP group
- Name server group

Generic Traps

Setting up the switch's SNMP connection to an existing managed network allows the network system administrator to receive the following generic traps:

- **coldStart** — Indicates the manage node has reinitialized itself such that the manage node's configuration can be altered.
- **warmStart** — Indicates the manage node has reinitialized itself, but no configuration has changed.
- **linkDown** — Indicates an IP interface (Ethernet, loop back, or embedded N_Port) has gone down and is not available.
- **linkUp** — Indicates an IP interface (Ethernet, loop back, or embedded N_Port) has become available.

NOTE: The linkUp and linkDown traps are not associated with removing or adding an Ethernet cable. These traps indicate that the interface is configured, operational, and available and do not necessarily mean that the physical network cable is affected.

- **authenticationFailure** — Indicates the manage node has received a protocol message that is not properly authenticated. This trap, by default, is disabled but can be enabled by way of the **agtcfgset** command.

Enterprise Specific Traps

The following Enterprise Specific Traps are supported:

- **swFault** — Indicates the diagnostics detect a fault with the switch.
- **swSensorScn** — Indicates an environment sensor changes its operational state. For example; a fan stops working. The VarBind in the Trap Data Unit contains the corresponding instance of the sensor status.
- **swFCPortScn** — A notification that an FCP changes its operational state. For instance, the FCP goes from online to off-line. The VarBind in the Trap Data Unit contains the corresponding instance of the port's operational status.
- **swEventTrap** — A notification that an event has occurred and its event severity level is at or below the value set in the variable swEventTrapLevel. The VarBind in the Trap Data Unit contains the corresponding instance of the event index, time information, event severity level, the repeat count, and description.

The parameters can be configured by way of the **SNMPv1 SET** command with an appropriate community. These parameters can also be configured by way of a **Telnet** connection, using the **agtcfgSet** command.

NOTE: SNMP swFCPortScn traps are generated on gigabit interface converter (GBIC) insertion and removal even though the state remains offline.

Manage Node Configuration

Changes to SNMP from either **Telnet** or SNMP are not displayed in SNMP until the switch is rebooted running. This is due to SNMP running from cache while the active settings are running from the flash programmable read-only memory (PROM).

The configurable parameters include the following:

- SNMPv1 communities (up to 6)
- Trap recipients (1 per community)
- sysName
- sysContact
- sysLocation
- authenticationFailure — Indicates the manage node has received a protocol message that is not properly authenticated. This trap, by default, is disabled but can be enabled by way of the **agtcfgset** command.
- swEventTrapLevel — Indicates the swEventTrap severity level in conjunction with an event's severity level. When an event occurs and if its severity level is at or below the set value, the SNMP trap, swEventTrap, is sent to configured recipients. By default, this value is set at **0**, implying that no swEventTrap is sent. Possible values are as follows:

  0 — None

  1 — Critical

  2 — Error

  3 — Warning

  4 — Informational

  5 — Debug

See Appendix A, "Error Messages," for more information.

These parameters can be changed by way of the **Telnet** command, the **agtcfgset** command or by way of SNMP.

The sysX parameters can be configured by way of the **SNMPv1 SET** command with an appropriate community. These parameters can be configured by way of a **Telnet** connection, using the **agtcfgset** command.

*NOTE: A change in the first two configuration parameters takes effect **only** after rebooting the switch.*

Name Server

The FCP inquiry data obtained by device probing may now be obtained from the Name Server by retrieving the port symbolic name.

Common Transport (CT) requests and responses including Name Server are recorded in the *portLog*. A typical trace is shown in the following example, where port 4 logs in to the Name Server and issues command 217. It receives an Accept (8002).

```
Jun 15 16:00:21.899  tReceive    Rx3       4  116
22fffffc,00210413,03000000

Jun 15 16:00:21.899  tSwitch     Tx3       4  116
23210413,00fffffc,02000000

Jun 15 16:00:21.899  tReceive    Rx3       4   52
02fffffc,00210413,01000000

Jun 15 16:00:21.933  tNSd        ctin      4   fc
00030217,00210413,00000100

Jun 15 16:00:21.933  tNSd        ctout     4   fc 00008002

Jun 15 16:00:21.933  tNSd        Tx3       4    0
03210413,00fffffc
```

Managing With the Dell PowerVault Fibre Channel Switch Manager

Use the PowerVault Fibre Channel Switch Manager (web interface) to log onto a switch from a host with a Java-enabled web browser by way of the Internet or Intranet to remotely manage a storage area network (SAN) composed of switches and other SAN devices. The PowerVault Fibre Channel Switch Manager allows you to dynamically interact with any switch in the SAN to monitor status and performance. Use the available information to make overall topology decisions (for example, increasing a path's bandwidth due to date saturation.) Additionally, you can change a switch's configuration to download firmware. The Administrative Interface and **Telnet** provide the means to make administrative changes, and security is enforced by username and encrypted passwords.

The PowerVault Fibre Channel Switch Manager also provides access to all zoning functions.

For more information about zoning and the PowerVault Fibre Channel Switch Manager see the *Dell PowerVault 5xF Switches Zoning Guide* and the *Dell PowerVault Switch Manager User's Guide*.

CHAPTER 4
PowerVault 56F 16-Port Fibre Channel Switch Commands

This chapter contains information and examples on managing and monitoring the PowerVault 56F 16-Port Fibre Channel switch by way of **Telnet**, including:

- General commands
- Diagnostic commands

The user can configure, operate, and test the switch using the following commands and settings through the **Telnet** interface.

General Commands

The following general commands allow you to control basic switch operations.

NOTE: For zone-specific commands, refer to the Dell PowerVault 5xF Switches Zoning Guide.

Command Line Editing Commands

The **Telnet** session responds to UNIX editing commands. Table 4-1 lists command line editing commands.

NOTE: The command line interface does not support keyboard buffering. Wait for the command prompt to appear before issuing a switch command.

Table 4-1. Command Line Editing Commands

Command	Description
`k or -`	Scroll backwards through previous commands
`j or +`	Scroll forward through previous commands
`a`	Insert text after cursor

Table 4-1. Command Line Editing Commands *(continued)*

Command	Description
l	Insert text before cursor
A	Insert text at end of current line
dd	Delete entire line
D	Delete from cursor to end of line
h	Move one space left
l	Move one space right
R	Replace text
x	Delete one character
u	Undo last change
<esc>	Enter command mode
<Backspace> or <Ctrl><h>	Back up
<Ctrl><u>	Erase all current text and begin again

agtcfgDefault

This **agtcfgDefault** command allows **admin** to reset the configuration of the Simple Network Management Protocol (SNMP) agent to factory defaults, as shown in the following example:

```
switch:admin> agtcfgDefault

Committing configuration...done.

agent configuration reset to factory default

sw5:admin> agtcfgShow

Current SNMP Agent Configuration

Customizable MIB-II system variables:

   sysdescr = Fibre Channel Switch.

   syslocation = End User Premise

   syscontact = Field Support.

   sweventtraplevel = 0

   authtraps = 0 (OFF)
```

```
SNMPv1 community and trap recipient configuration:
   Community 1: Secret C0de (rw)
      No trap recipient configured yet
   Community 2: OrigEquipMfr (rw)
      No trap recipient configured yet
   Community 3: private (rw)
      No trap recipient configured yet
   Community 4: public (ro)
      No trap recipient configured yet
   Community 5: common (ro)
      No trap recipient configured yet
   Community 6: FibreChannel (ro)
      No trap recipient configured yet
sw5:admin>
```

Table 4-2 describes the fields for the **agtcfgDefault** command.

Table 4-2. agtcfgDefault Command Field Descriptions

Field	Description
sysDescr	The system description (in MIB-II definition). The default value is set as Fibre Channel Switch.
sysLocation	The location of the system (switch) (in MIB-II). The default value is set as End User Premise.
sysContact	The contact information for this system (switch). The default value is set as Field Support.
swEventTrapLevel	The event trap level in conjunction with an event's severity level. When an event occurs and if its severity level is at or below the set value, the SNMP trap, **swEventTrap**, is sent to configured trap recipients. By default, this value is set at **0**, implying that no **swEventTrap** is sent. Other possible values are: **0** = None **1** = Critical **2** = Error **3** = Warning **4** = Informational **5** = Debug See "errShow" found later in this chapter for related information.

Table 4-2. agtcfgDefault Command Field Descriptions *(continued)*

Field	Description
authTraps	authenticationFailure (the authentication trap) is transmitted to the configured trap recipient in the event the agent received a protocol message that is not properly authenticated. In the context of SNMPv1 and SNMPv2c, this means that a request that contains a community string is not known to the agent. The default value for this parameter is **0** (disabled).

In addition, six communities and respective trap recipients are supported by the agent. The first three communities are for read-write "rw" access and the last three are for read-only "ro" access.

The factory default value for the trap recipient of each community is 0.0.0.0. The factory default values for the community strings are:

- Secret Code
- OrigEquipMfr
- private
- public
- common
- Fibre Channel

NOTE: For an SNMP Management Station to receive a trap generated by the agent, the administrator must configure a trap recipient value to correspond to the Internet Protocol (IP) address of the Management Station.

agtcfgSet

The **agtcfgSet** command sets the SNMP agent configuration to a Fiber Channel switch, as shown in the following example. The command fields are described in Table 4-2.

NOTE: A management platform's IP address must be configured as a trap recipient to enable discovery by that management platform. HP OpenView Network Node Manager Special Edition (NNM SE) 3.0 and later have management information base (MIB) and autodiscovery support for the switch.

```
switch:admin> agtcfgSet

Customizing MIB-II system variables ...

At each prompt, do one of the following:
  o <Return> to accept current value,
  o enter the appropriate new value,
  o <Control-D> to skip the rest of configuration, or
  o <Control-C> to cancel any change.

To correct any input mistake:
<Backspace> erases the previous character,
<Control-U> erases the whole line,
sysDescr: [FC Switch.]
sysLocation: [End User Premise]
sysContact: [Field Support.]
swEvevtTrapLevel: (0..5) [3]
authTrapsEnabled (true, t, false, f): [true]

SNMP community and trap recipient configuration:
Community(rw): [Secret C0de]
Trap Recipient's IP address in dot notation: [192.168.1.51]
Community(rw): [OrigEquipMfr]
Trap Recipient's IP address in dot notation: [192.168.1.26]
Community(rw): [private]
Trap Recipient's IP address in dot notation: [0.0.0.0] 192.168.
Community(ro): [public]
Trap Recipient's IP address in dot notation: [0.0.0.0]
Community(ro): [common]
Trap Recipient's IP address in dot notation: [0.0.0.0]
Community(ro): [FibreChannel]
Trap Recipient's IP address in dot notation: [0.0.0.0]
```

agtcfgShow

The **agtcfgShow** command displays current SNMP agent configuration. The fields are described in Table 4-2.

aliasShow

The **aliasShow** command displays local Alias Server information, as shown in the following example. The command fields are described in Table 4-3. If there is no local alias group, a message stating that is displayed, otherwise, it shows the user the number of alias group entries created with the title:

```
The Local Alias Server has n entries

Alias ID Creator Token [rb, type, grptype, qlfr] Member List
```

Table 4-3. aliasShow Command Field Descriptions

Field	Description
Alias ID	This is the multicast address and has the format of FFFB*xx*, where *xx* is an odd number ranging from 01 to 31. This number is the name of the multicast group.
Creator	The Fibre Channel address ID of the Nx_Port that created this Alias group.
Creator Token	The Alias token that has been provided to map to the Alias group. It consists of four subfields: **rb** = Routing bits **type** = Upper level application type **grptype** = The alias group type (can only be 10 for multicast) **qlfr** = Alias Qualifier of the group These subfields are delimited by a pair of square braces. For more information about Alias Token, see the FC-PH-2 and FC-GS-2 American National Standards Institute (ANSI) standards.
Member List	A list of member address IDs, delimited by a pair of curly braces.

configure

Figure 4-1, Figure 4-2, and Figure 4-3 show examples of the **configure** command, which is used to set some switch configuration parameters. This command may not be executed on an enabled switch; you must first disable the switch using the **switchdisable** command.

The **configure** command is navigated by entering a series of collapsible top-level menus. Each menu divides up the various switch configuration parameters into logical groupings, which include: fabric parameters, virtual channel parameters, arbitrated loop parameters, and system service parameters.

Each top level menu and its associated submenus consist of a text prompt, a list of acceptable values, and the current value (shown in brackets). The current value is used in the absence of an entered value when a carriage return is the only input

entered at the prompt, as shown in Figure 4-1. The various configuration settings and parameters are described in Table 4-4, Table 4-5, Table 4-6, Table 4-7 and Table 4-8.

```
switch:admin> configure
Configure...
Fabric parameters (yes, y, no, n): [no]
Virtual Channel parameters (yes, y, no, n): [no]
Arbitrated Loop parameters (yes, y, no, n): [no]
System services (yes, y, no, n): [no]
No changes.
```

Figure 4-1. configure Command Top-Level Menus

Entering out-of-range or inappropriate values causes an error message to be displayed on the screen and the original entry prompt to be redisplayed as shown in Figure 4-3.

To cancel the **configure** command at any time, send an interrupt control character by pressing <Ctrl> <c>. To complete the command at any time, with the current changes saved, send an end-of-file control character by pressing <Ctrl><d>.

```
switch:admin> configure
Configure...
Fabric parameters (yes, y, no, n): [no] yes
Domain: (1..239) [1]
BB credit: (1..16) [16]
R_A_TOV: (4000..120000) [10000]
E_D_TOV: (1000..5000) [2000]
Data field size: (256..2112) [2112]
Non-SCSI Tachyon Mode: (0..1) [0]
Disable Device Probing: (0..1) [0]
Unicast-only Operation: (0..1) [0]
VC Encoded Address Mode: (0..1) [1]
Disable Translative Mode: (0..1) [1]
Per-frame Route Priority: (0..1) [0]
Virtual Channel parameters (yes, y, no, n): [no] yes
VC Link Control: (0..1) [0]
VC Class 2: (2..5) [2]
VC Class 3: (2..5) [3]
VC Multicast: (6..7) [7]
VC Priority 2: (2..3) [2]
VC Priority 3: (2..3) [2]
VC Priority 4: (2..3) [2]
VC Priority 5: (2..3) [2]
VC Priority 6: (2..3) [3]
VC Priority 7: (2..3) [3]
Arbitrated Loop parameters (yes, y, no, n): [no] yes
Send FAN frames?: (0..1) [1]
System services (yes, y, no, n): [no] yes
rstatd (on, off): [off] on
rusersd (on, off): [off] on
No changes.
```

Figure 4-2. configure Command Submenus

```
switch:admin> configure
Configure...
Fabric parameters (yes, y, no, n): [no] y
Domain: (1..239) [0] 256
integer must be between 1 and 239 - please re-enter
Domain: (1..239) [0]
BB credit: (1..16) [16] one
Input not acceptable, please re-enter
BB credit: (1..16) [16]
R_A_TOV: (4000..120000) [10000]
E_D_TOV: (1000..5000) [2000] 4900
integer must be a multiple of 1000 - please re-enter
E_D_TOV: (1000..5000) [2000] 5000
Data field size: (256..2112) [2112] ^D
Committing configuration...done.
```

Figure 4-3. configure Command Behavior With Out-of-Range or Inappropriate Inputs

A number of parameters control the overall behavior and operation of the fabric. Some of these values, such as the domain, are normally assigned automatically by the fabric and may be different from one switch to another in the fabric. However, other parameters, such as the buffer-to-buffer credit or the time out values, may be changed to suit particular application programs or operating environments, but must be in agreement among all switches to allow formation of the fabric.

Table 4-4 defines the settings affecting the fabric.

Table 4-4. Fabric Settings

Field	Type	Default	Range
Domain	Number	1	Varies
BB Credit	Number	16	1 - 16
R_A_TOV	Number	10000	E_D_TOV * 2 to 120000
E_D_TOV	Number	2000	1000 to R_A_TOV / 2
Data Field Size	Number	2112	256 to 2112
Non-SCSI Tachyon Mode	Boolean	0	0 or 1
Disable Device Probing	Boolean	0	0 or 1
VC Encoded Address Mode	Boolean	1	0 or 1
Disable Translative Mode	Boolean	0	0 or 1
Per-frame Route Priority	Boolean	0	0 or 1

A listing of the configurable fabric parameters is shown in Table 4-5.

Table 4-5. Fabric Parameters

Field	Description
Domain	The domain number uniquely identifies the switch in a fabric and may be any value between 1 and 239. Normally, this value is automatically assigned by the fabric.
BB credit	The buffer-to-buffer (BB) credit represents the number of buffers, in a range from 1 to 16, available to the host. For a complete description of this value, refer to the industry specification Fibre Channel Physical and Signaling Interface (FC-PH).
R_A_TOV	The Resource Allocation Time Out Value (R_A_TOV) is displayed in milliseconds. This variable works with the variable E_D_TOV to determine the switch's actions when presented with an error condition. Allocated circuit resources with detected errors are not released until the time out value has expired. If the condition is resolved prior to the time out, the internal time out clock resets and waits for the next error condition.
E_D_TOV	Error Detect Time Out Value (E_D_TOV) is displayed in milliseconds. This timer is used to flag a potential error condition when an expected response is not received (an acknowledgment or reply in response to packet receipt, for example) within the set time limit. If the time for an expected response exceeds the set value, then an error condition is met.
Data field size	This specifies the largest possible value, in bytes, for the size of a type 1 (data) frame. The switch advertises this value to other switches in the fabric during construction of the fabric as well as to other devices when they connect to the fabric. Setting this field to a value smaller than 2112 may result in decreased performance.
Non-SCSI Tachyon Mode	When set, multiple sequences from different sources are interleaved to Tachyon-based controllers at sequence boundaries rather than at frame boundaries, resulting in better performance from Tachyon-based controllers. Set this mode when there are no Tachyon-based small computer systems interface (SCSI) host adapters connected to the fabric.
Disable Device Probing	When this is set, devices that do not register themselves with the Name Server are not present in the Name Server database. Set this mode only if the switch's N_Port discovery process (PLOGI, PRLI, INQUIRY) causes some attached device to fail.

Table 4-5. Fabric Parameters *(continued)*

Field	Description
VC Encoded Address Mode	When this mode is set, frame source and destination addresses utilize an address format compatible with PowerVault 50F. When this mode is set to **0**, 239 PowerVault 51F switches may be cascaded.
Disable Translative Mode	The setting is only relevant if VC Encoded Address Mode is also set. When set, this mode maintains explicit address compatibility with first-generation switches. However, enabling this feature also disables translative/phantom addressing. Set this mode only if hardware or software systems are attached to the fabric which explicitly rely on a specific frame address format.
Per-frame Route Priority	In addition to the eight virtual channels used in frame routing priority, support is also available for per-frame based prioritization. When set, the virtual channel ID is used in conjunction with a frame header to form the final virtual channel ID.

The switch provides the ability to tune the switch in a specific application, by configuring the parameters for the switch's eight virtual channels. Note that the first two virtual channels are reserved for the switch's internal functions and are not user-configurable. The default virtual channel settings have already been optimized for switch performance. Changing the default values, if properly selected, may improve switch performance somewhat, but may also severely degrade performance.

You should not change these settings without fully understanding the effects of those changes. Table 4-6 describes the virtual channel parameters.

Table 4-6. Virtual Channel Parameters

Field	Description	Default
VC Link Control	This changes the virtual channel used for N_Port-generated, Class 2 link control frames (ACKs, P_BSYs, and P_RJTs). **0** = Force N_Port-generated link control frames to be sent back using a Class 2 data virtual channel. **1** = Force N_Port-generated link control frames to be sent back using a virtual channel normally reserved for fabric-internal traffic.	0
VC Class 2	Sets the virtual channel used for Class 2 frame traffic. May be set to virtual channel 2, 3, 4, or 5.	2

Table 4-6. Virtual Channel Parameters

Field	Description	Default
VC Class 3	Sets the virtual channel used for Class 3 frame traffic. May be set to virtual channel 2, 3, 4, or 5.	3
VC Multicast	Sets the virtual channel used for multicast frame traffic. Verify that the multicast channel has the frame class priority set to the frame class of the expected traffic.	7
VC Priority 2-7	The numbers displayed show the priorities assigned to each of the switch's virtual channels. Allowed values are 2 or 3, indicating that the channel gives priority to either Class 2 or Class 3 frame traffic, respectively.	2 or 3

Table 4-7 describes the arbitrated loop parameters.

Table 4-7. Arbitrated Loop Parameters

Field	Description	Default
Send FAN frames?	Fabric Address Notification (FAN) frames are sent by the fabric to notify public loop devices about their node ID and address. 0 = No, do not send FAN frames. 1 = Yes, send FAN frames.	1
Always send RSCN?	Following the completion of loop initialization, a remote state change notification (RSCN) is issued only when F_Ports detect the presence of new devices or the absence of preexisting devices. When this feature is set, a RSCN is always issued following the completion of loop initialization, regardless of the presence or absence of new or preexisting devices.	1

Table 4-8 describes the system services.

Table 4-8. System Services

Field	Description	Default
rusersd	Dynamically enables or disables a server that returns information by way of remote procedure calls (RPC) about the user logged into the system. The information returned includes: the user login name, the system name, the login protocol or type, login time, idle time, and remote login location (if applicable). The retrieval of this information is supported by a number of operating systems which support RPC. On most UNIX-based systems (HP-UX, Irix, Linux, Solaris, and so on), the command to retrieve the information is **rusers**. Please see your local system documentation for the appropriate usage of the **rusers** or equivalent command.	Off
rstatd	Dynamically enables or disables a server that returns information by way of RPC about system operation information. The protocol provides for a wide range of system statistics; however, only the Ethernet interface statistics and system up time are supported. The retrieval of this information is supported by a number of operating systems which support RPC. On most UNIX-based systems (HP-UX, Irix, Linux, Solaris, and so on) the commands to retrieve the information are **rup** and **rsysinfo**. Please see your local system documentation for the appropriate usage of the **rup**, **rsysinfo**, or equivalent commands.	Off

configDefault

The **configDefault** command is used to reset some of the switch configuration values to their factory default values. In addition, this command configures the switch to boot from its internal firmware if it has been previously configured to boot from the network. This command may not be executed on an enabled switch; you must first disable the switch using the **switchDisable** command.

```
switch:admin> configDefault

Committing configuration...done.
```

Because some configuration parameters are cached by the switch, it is recommended that the switch be rebooted immediately following the execution of the **configDefault** command, or unexpected behavior may result. With the exception of the following parameters, all configuration parameters are reset to their default values:

- World Wide Name
- Ethernet MAC address
- Ethernet IP address and subnetmask
- IP gateway address
- OEM customization
- SNMP configuration
- Zoning configuration
- License keys
- System name

configShow

The **configShow** command displays the current settings of many of the switch's configurable parameters. The output of the command is broken up into two sections; the first displays the switch's boot settings and the second displays other configuration parameters, most of which are set from the configure command.

NOTE: The entry shown for the lcdContrast parameter is set when the switch is manufactured and is not user-configurable.

date

The **date** command displays the system date and time. To set the date, perform the following steps:

1. Type `date` followed by the date in the order of *mmddHHMMyy* where:
    a. *mm* is the month
    b. *dd* is the date
    c. *HH* is the hour

d. *MM* are the minutes

e. *yy* is the year

2. Press <Enter> to set the date and time.

NOTE: The date function does not support daylight savings time. The date must be reset manually when the time changes.

diagHelp

The **diagHelp** command displays the diagnostic help commands available for trouble-shooting switch problems. These commands should be run only as advised by Dell technical support. The following example shows the information that appears when the command is run.

```
switch:admin> diagHelp

ramTest                 System DRAM diagnostic
portRegTest             Port register diagnostic
centralMemoryTest       Central memory diagnostic
cmiTest                 CMI bus connection diagnostic
camTest                 Quickloop CAM diagnostic
portLoopbackTest        Port internal loopback diagnostic
sramRetentionTest       SRAM Data Retention diagnostic
cmemRetentionTest       Central Mem Data Retention diagostic
crossPortTest           Cross-connected port diagnostic
spinSilk                Cross-connected line-speed exerciser
diagClearError          Clear diag error on specified port
diagDisablePost         Disable Power-On-Self-Test
diagEnablePost          Enable Power-On-Self-Test
setGbicMode             Enable tests only on ports with GBICs
supportShow             Print the switch info for debugging
diagShow                Print diagnostic status information
```

errDisplayFilter

The **errDisplayFilter** command allows you to specify the minimum error level to be reported on the PowerVault 51F switch only. Error level values range from 1 to 5. The following is example of the **errDisplayFilter** command:

```
switch:admin> errDisplayFilter
```

Errors with a level of severity lower than 4 are displayed in the error log.

errDump

The **errDump** command prints the contents of the error log with no page breaks.

errShow

The **errShow** command displays all detected errors, one error at a time. The error log stores the last 32 error types sensed by the switch. The log shows:

- Error number (01-64)
- Date and time of the first occurrence each error type was sensed
- Total number of occurrences of each error type

NOTE: The maximum number of occurrences is 999.

- Error type
  - Error level for each error type
  - **0** = Panic (when this level is reached, the switch automatically reboots and the display no longer shows the error)
  - **1** = Critical
  - **2** = Error
  - **3** = Warning
  - **4** = Debug

For a detailed explanation of each error type, its probable cause, and suggested corrective actions, see Appendix A, "Error Messages."

The following information is displayed in the **errShow** screen:

- The switch detected two errors.
- The task ID and task name that incurred the error (task names are displayed using the **i** command). For example, `0x10fc92f0`.
- The error type, date and time, the error level, and description.
  - If there is more than one occurrence of an error type, the number of occurrences is shown in brackets following the error date and time.

The following is an example of the **errShow** command screen.

```
switch:admin> errShow

Error 02
--------
0x103dc470 (tSilkworm): Apr  9 10:41:06
    Error SENSOR-FAILED, 3, sensor 7 (Fan 2) is below minimum

Type <CR> to continue, Q<CR> to stop:

Error 01
--------
0x103dc470 (tSilkworm): Apr  9 10:40:51
    Error DIAG-TIMEOUT, 1,
  Port 2 receive timeout.

Type <CR> to continue, Q<CR> to stop:
```

fabricShow

The **fabricShow** command displays a list of switches and multicast alias groups in a fabric. The fields are described in Table 4-9.

The following is an example of the **fabricShow** command screen.

```
switch:admin> fabricShow
Switch ID   Worldwide Name           Enet IP Addr    FC IP Addr
----------------------------------------------------------------
  0: fffc40 10:00:00:60:69:00:10:63  192.168.1.1     0.0.0.0
  1: fffc41 10:00:00:60:69:00:0a:12  192.168.1.2     0.0.0.0
  2: fffc42 10:00:00:60:69:00:01:b4  192.168.1.3     0.0.0.0
```

Table 4-9. fabricShow Command Field Descriptions

Fabric Element	Description
switch n	Each line shows: • The switch's domain ID (1 to 239) • The switch's embedded port ID • The switch's World Wide Name • The switch's Ethernet and IP addresses • The switch's symbolic name (a ">" indicates the principal switch in the fabric)

Table 4-9. fabricShow Command Field Descriptions *(continued)*

Fabric Element	Description
multicast alias group	Each line shows: • The alias group number (01 to 31) • The alias group ID • The alias token Alias groups are only created on demand by requests to the alias server; typically no groups are listed.

fastboot

The **fastboot** command initiates a *warm* reboot that bypasses POST and takes about one minute to reboot the switch. The switch may be in any operational state (enabled or disabled) before rebooting.

The following is an example of the **fastboot** command screen.

```
switch:admin> fastboot
Rebooting...
```

firmwareDownload

The **firmwareDownload** command downloads firmware into flash memory. This command *can* be executed on an operational switch. A reboot is required to initiate the new firmware after the download has completed. The following is an example of the **firmwareDownload** command screen.

```
switch:admin> firmwareDownload "host","user", c:/
firmware/v2.0
  1159196+194916+876016, csum 7eca
writing flash 0......
  download complete
```

Firmware can be downloaded from a UNIX, Windows 9*x*, Windows NT, or Windows 2000 host. For a UNIX host, no special software is needed. For Windows 9*x*, Windows NT or Windows 2000 host, the PowerVault utilities diskette provides a daemon to support a remote shell (RSH). A firmware download is executed by way of an RCP command running on top of Transmission Control Protocol (TCP) between the switch and the host.

To download the firmware, perform the following steps:

1. Run the **setup.exe** file on the PowerVault utilities diskette to install the **rshd.exe** and **cat.exe** utility files on the hard-disk drive.
2. Click **Start** and then click **Programs**.

3. In the program list, click **Dell OpenManage PowerVault Manager**, then click **PowerVault 51F Utilities**, then click **rshd**.

   The remote shell daemon starts. The **cat.exe** is run from the **rshd.exe** file

4. Start a **Telnet** session to a switch by typing the following command:

   ```
   telnet [switch IP address]
   ```

5. Log in as `admin` by typing the following command:

   ```
   login: admin
   ```

6. Then type:

   ```
   firmwareDownload ["host name/IP address"], ["user name"],
   ["filename"]
   ```

   For example:

   ```
   => firmwareDownload "192.111.2.1", "johns", "/tmp/os/v1.6"
   ```

NOTE: The host name can be the host IP address and the file name is a path to the new firmware file.

The RSH server validates the user and delivers the file to the switch where it is stored in flash memory, as shown in the following example:

```
writing flash 0 ......................
```

7. Reboot the switch to initiate the new firmware.
8. After **rshd.exe** completes the download, stop **rshd.exe** by pressing <Ctrl><c>.

   To minimize any security exposure, terminate the RSH daemon.

NOTE: Idle the I/O before downloading the software.

h

The **h** command prints the shell history of the previous 20 commands. The older commands are replaced by new commands. The shell history is similar to the UNIX Korn shell history facility with an integrated line editor (similar to UNIX VI) that allows previously typed commands to be edited.

NOTE: The shell history is reset by a reboot.

help

The **help** command displays a list of commands in alphabetical order, with additional lists of "grouped" commands.

The **help** display changes depending on the login user level, license key, and switch model, and will display only on licensed products using front panel commands. The types of admin level commands available are:

- General
- Diagnostic
- Routing
- Licensed
  - — Zoning commands

i

The **i** command prints a currently running task summary. The fields are described in Table 4-10.

Table 4-10. i Command Field Descriptions

Field	Description
Name	Task name
Entry	Task entry point ID
TID	Task ID
PRI	Task priority
Status	**Ready** — Task is not waiting for any resource other than the microprocessor **Pend** — Task is blocked due to the unavailability of some resource **Delay** — Task is asleep for some duration **Suspend** — Task is unavailable for execution (but not delayed or pended) **Delay** — +S Task is both delayed and suspended **Pend** — +S Task is both pended and suspended **Pend** — +T Task is pended with a timeout **Pend** — +S+T Task is pended with a timeout and also suspended **Dead** — Task no longer exists
PC	Program counter
SP	Stack pointer
ERRNO	Last error number generated by this task
Delay	For pending tasks, the amount of time a task has been waiting to execute

ifShow

The **ifShow** command displays a summary of currently running tasks. The display includes three sections organized by interface:

- `ei` — Ethernet 10/100BASE-T port
- `lo` — Loopback interface
- `fc` — Fibre Channel; this section is omitted if IP over Fibre Channel is not configured

ipAddrSet

The following example shows the **ipAddrSet** command, which sets the switch's Ethernet IP address, Ethernet subnetmask, Fibre Channel IP address, Fibre Channel subnetmask, and gateway address. The fields are described in Table 4-11.

```
switch:admin> ipAddrSet
Ethernet IP Address [192.168.90.241]:
Ethernet Subnetmask [none]:
Fibre Channel IP Address [192.168.65.241]:
Fibre Channel Subnetmask [none]:
Gateway Address [192.168.90.1]:
```

NOTE: Consult your network administrator for the appropriate IP address(es), subnetmask(s), and gateway address.

Table 4-11. ipAddrSet Command Field Descriptions

Field	Description
Ethernet IP address	The default IP address on a new switch is a temporary number derived from the switch's World Wide Names (WWN); enter a valid IP address
Ethernet subnetmask	The Ethernet subnetmask value; the default subnetmask value is **none**; see your network administrator for the appropriate subnetmask value to enter here
Fibre Channel IP address	The Fibre Channel IP address for the switch; enter a valid IP address (not currently supported)
Fibre Channel subnetmask	The Fibre Channel subnetmask for the switch; the default is **none**
Gateway IP address	The gateway IP address; the default gateway address on a new switch is **none**; you must enter a valid gateway address, if required

After each prompt, the current value is shown inside brackets; the user may enter one of the following actions:

- Press <Return> (Keeps the current value)
- An IP address in conventional dot (**.**) notation
- The word **none**
- Press <Ctrl><c> (Cancels any changes)
- Press <Ctrl><d> (Accepts any changes but skips remaining input)

A final prompt asks whether to set IP addresses to the new values. Typing `y` installs the new values; typing `n` delays the changes until the next switch reboot. If the Ethernet IP address being used to **Telnet** to the switch is changed and the user types `y`, then the **Telnet** session is closed.

ipAddrShow

The **ipAddrShow** command displays the switch's IP addresses. The fields are described in Table 4-11.

login

The **login** command allows a user to log in to the switch with a different user name and password, without first logging out. If the user is connected by way of a **Telnet** or log-in session, then the session is left open unlike using the **logout** command.

This command is typically used to gain access to commands that are not allowed at the current user level.

logout

The **logout** command allows a user to log out from a **Telnet**, log in or serial port session. **Telnet** and log in connections are closed, the serial port returns to the `login:` prompt.

The commands **exit** and **quit** are accepted as synonyms for **logout**, as is <Ctrl><d> typed at the beginning of a line.

nsAllShow

The **nsAllShow** command displays the 24-bit Fibre Channel Port (FCP) IDs of all devices in all switches in the fabric. The **nsAllShow** command optionally takes an integer parameter, the value of the FC-PH type. The possible values for **FC4Type** are:

- 5 - FC-IP
- 8 - SCSI-FCP

For example, **nsAllShow 8** shows all SCSI-FCP nodes. If the parameter is not provided, then all Nx_Ports are displayed.

nsShow

The **nsShow** command displays local name server information, which includes information about devices connected to this switch, and cached information about devices connected to other switches in the fabric.

The message `There is no entry in the Local Name Server` is displayed if there is no information on this switch, but there still might be devices connected to other switches in the fabric. The command **nsAllShow** shows information from all switches; otherwise, text similar to the following example appears informing the user the number of name service entries that have been created with the title:

```
The Local Name Server has n entries

     Type Pid COS PortName NodeName TTL(sec)
```

Each subsequent line of output shows the value of each field as described in Table 4-12. There may be additional lines if the device has registered any of the following information (the switch automatically registers SCSI Inquiry data for FCP target devices): FC4s supported, IP address, IPA, port and node symbolic names.

There are six major columns of information for each entry.

Table 4-12. nsShow Fields

Field	Description
Type	The port type with one of the following values: **N** indicating that this is an N_Port **NL** indicating that is an NL_Port
PID	The address ID of the port in hexadecimal.
COS	The Class of Service supported by the port.
PortName	The Port World_wide_Name.
NodeName	The Node World_wide_Name associated with the port.
TTL	The 'time-to-live' value of the entry; this is typically set to not-applicable (**na**) for a local entry. Occasionally, an entry might be a cached version of a remote port (that is, not directly connect to this switch). In that case, the value is the number of seconds before the cached entry expires and gets deleted from the local database. Note also that a cached entry would have an asterisk (*) at the beginning.

NOTE: Only local entries are displayed.

passwd

The **passwd** command is used to set user names and passwords.

The command syntax is `passwd [ "user name" ].`

The optional parameter <user name> is a double-quoted, valid user name.

If the current password is incorrect, the command exits without saving any changes. If the number of retries attempts is exceeded, the command either steps to the next user or exits, saving any changes made thus far.

portDisable

The **portDisable** command disables a specific port. Devices attached to a disabled port cannot communicate with the fabric. The command syntax is `portDisable <port #>`.

portEnable

The **portEnable** command enables a specific port. The command syntax is `portEnable <port #>`.

portErrShow

Figure 4-13 shows an example of the **portErrShow** command screen, which displays an error summary for all ports. One output line is displayed per port, and shows error counters in ones, thousands (the number is followed by 'k'), or millions (the number is followed by 'm'). The fields are described in Table 4-14. The figure shows an eight-port switch where port six has a high number of errors and should be examined.

```
switch:admin> portErrShow
       frames  enc  crc  too  too  bad  enc disc link loss loss frjt fbsy
     tx   rx   in  err shrt long  eof  out   c3 fail sync  sig
    ------------------------------------------------------------------------
0:    0    0    0    0    0    0    0    0    0    0    0    1    0    0
1:  2.5m  38    0    0    0    0    0    2    0    0    1    1    0    0
2:    0    0    0    0    0    0    0    0    0    0    0    1    0    0
3:   95k  15k  0    0    0    0    0    3    0    0    1    0    0    0
4:    0    0    0    0    0    0    0    0    0    0    0    1    0    0
5:    0    0    0    0    0    0    0    0    0    0    0    1    0    0
6:   61k  48    2   15    0    0    0   3k    0    0    2    0    0    0
7:    0    0    0    0    0    0    0    0    0    0    0    1    0    0
```

Figure 4-13. portErrShow Command Example

Table 4-14. portErrShow Command Field Descriptions

Field	Description
frames tx	Frames transmitted
frames rx	Frames received

Table 4-14. portErrShow Command Field Descriptions *(continued)*

Field	Description
enc in	Encoding errors inside of frames
crc err	Frames with cyclic redundancy check (CRC) errors
too shrt	Frames shorter than minimum
too long	Frames longer than maximum
bad eof	Frames with bad end-of-frame delimiters
enc out	Encoding error outside of frames
disc c3	Class 3 frames discarded
link fail	Link failures (LF1 or LF2 states)
loss sync	Loss of synchronization
loss sig	Loss of signal
frjt	Frames rejected with F_RJT
fbsy	Frames busied with F_BSY

portLogClear

The **portLogClear** command clears the data from the port log. The command syntax is `portLogClear.`

portLogDump

The **portLogDump** command prints the port log without page breaks. The command syntax is `portLogDump.`

portStatsShow

The **portStatsShow** command, when used with a port number, gives a static view of the port status when the switch executed the command. For example, to update the command and check if an error count is increasing, reissue the **portStatsShow** command to capture another snapshot. Fields for the **portStatsShow** command are described in Table 4-15.

The command syntax is `portStatsShow <port #>`.

Table 4-15. portStatsShow Command Field Descriptions

Field	Description
stat_wtx	Number of 4-byte words transmitted from the port
stat_wrx	Number of 4-byte words received by the port
stat_ftx	Number of frames transmitted from the port
stat_frx	Number of frames received by the port
stat_c2_frx	Number of Class 2 frames received
stat_c3_frx	Number of Class 3 frames received
stat_lc_rx	Number of link control frames received
stat_mc_rx	Number of multicast frames received
stat_mc_to	Number of timeouts reported for multicast frames; a single frame could cause this counter to increment if it timed out for each multiple destination
stat_mc_tx	Number of multicast frames transmitted
tim_rdy_pri	Amount of time (measured in proprietary ticks) that R_RDY transmission has higher priority than frame transmission
tim_txcrd_z	Time that this port cannot transmit frames due to a transmit buffer-to-buffer credit of zero
er_enc_in	Received data: the number of 8b/10b encoding errors that have occurred inside frame boundaries; this counter is generally a nonzero value, although occasional errors may occur on a normal link and give a zero result; (Minimum compliance with the link bit error rate specification on a link continuously receiving frames would cause approximately one error every 20 minutes.)
er_crc	Received frames: the number of CRC errors detected
er_trunc	Received frames: the number of frames that were shorter than the minimum Fibre Channel frame size (for example, a header with no payload)
er_toolong	Received frames: the number of frames that were longer than the maximum Fibre Channel frame size (for example, a header with a 2,112-byte payload)
er_bad_eof	The number of frames received with a badly formed end-of-frame
er_enc_out	Receive link: the number of 8b/10b encoding errors recorded outside frame boundaries; this number may become nonzero during link initialization but indicates a problem if it increments faster than the allowed link-bit error rate (approximately once every 20 minutes)

Table 4-15. portStatsShow Command Field Descriptions *(continued)*

Field	Description
er_disc_c3	Receive link: the number of Class 3 frames discarded.; class 3 frames can be discarded due to timeouts or invalid/unreachable destinations; this quantity could increment at times during normal operation but might be used for diagnosing problems in some situations.
open	loop_open: the number of times FL_Port entered the OPEN state.
transfer	loop_transfer: the number of times FL_Port entered the TRANSFER state.
opened	FL_Port opened: the number of times FL_Port entered the OPENED state.
starve_stop	Loop tenancies stopped due to starvation
fl_tenancy	Number of times FL_Port has the loop tenancy
nl_tenancy	Number of times NL_Port has the loop tenancy
frame_nozone	Number of frames rejected due to zone protection

psShow

The following example shows the **psShow** command screen, which displays the power supply status and manufacture information. The format of the display varies according to the switch model and number of power supplies present.

```
switch:admin> psShow
Power Supply 1 is OK
9835,DH000000208,60-0000734-01, A,00001, E108302A,01, 803350
Power Supply 2 is OK
9839,DH000000253,60-0000734-01, A,00001, E108302A,01, 803522
```

The status of each supply is shown in Table 4-16.

Table 4-16. Power Supply Status

Status	Description
OK	Power supply present and functioning correctly
Absent	Power supply not present
Faulty	Power supply is present but faulty (no power cable, power switch turned off, fuse blown, or other internal error)

After the status line, a power supply identification line may be shown. If present, this line contains manufacture date, part numbers, serial numbers, and other information.

reboot

The **reboot** command reboots the switch to the stored configuration in flash memory and takes about 1 1/2 minutes. The switch may be in any operational state (enabled or disabled) before rebooting.

While the switch is rebooting, the **Telnet** session is closed and all FCPs become inactive. If the switch was part of a fabric, the remaining switches reconfigure.

switchDisable

The **switchDisable** command is used to take the switch offline for diagnostic tests, maintenance functions, or replacing a faulty switch.

You can observe and verify this process by watching the front panel light emitting diodes (LEDs) change color from green to slow flashing amber as each port goes inactive.

switchEnable

The **switchEnable** command enables the switch and provides fabric information. The switch may need to be enabled after maintenance and diagnostic tests.

The switch is enabled with a fabric domain ID of 1. After the fabric is reconfigured this switch is the principle address manager that is capable of assigning domain IDs to other switches in the same fabric.

You can observe and verify this process by watching the front panel LEDs change color from slow flashing amber to green as each port goes active.

switchName

The following example shows the **switchName** command screen, which displays *or* sets the switch's name. If a new name is specified and it is enclosed in quotes, the command sets the switch to that name. If no new name is included, the command displays the switch's name.

```
switch:admin> switchName "sw3"
Updating flash...
```

The command syntax is `switchName <name-of-switch>`.

The **switchName** command displays the name of the current switch. By supplying an argument, the user may set the name of the current switch.

NOTE: This command is only available to admin-level users.

Certain restrictions apply to the length and format of the switch name. Specifically, the name of the switch:

- May not exceed 19 characters in length
- May not contain characters other than a-z, A-Z, 0-9 or _ (the underscore character), the first character excepted
- Must have the first character be among a-z or A-Z

NOTE: It is suggested that switch names be unique in a cascaded environment.

switchShow

The following example shows the **switchShow** command screen, which prints switch and port status. The fields are described in Table 4-17.

```
switch:admin> switchShow
switchName:     open146
switchType:    3.1
switchState:    Online
switchRole:     Principal
switchDomain:   1
switchId:       fffc41
switchWwn:      10:00:00:60:69:00:04:64
port  0: sw  Online     FL-Port  1 private, 1 phantom
port  1: --  No_Module  G-Port
port  2: sw  No_Light   G-Port
port  3: sw  Online     FL-Port  1 private, 1 phantom
port  4: --  No_Module
port  5: sw  Online     E-Port  10:00:00:60:69:00:00:12 "sw1" (upstre
port  6: sw  No_Light
port  7: sw  No_Light
port  8: sw  No_Light
port  9: sw  Online     E-Port  10:00:00:60:69:00:01:b4 "sw3" (downst
port 10: sw  No_Light
port 11: sw  No_Light
port 12: sw  No_Light
port 13: sw  No_Light
port 14: sw  No_Light
port 15: sw  No_Light
value = 16 = 0x10
```

Table 4-17. switchShow Command Field Descriptions

Field	Description
switchName	The switch name
switchType	Model number and system board revision level; the model number is as follows: **1** = PowerVault 50F **2** = Reserved **3** = PowerVault 51F/56F
switchState	The state of this switch: online, offline, testing or faulty
switchRole	There are three possibilities for **switchRole** including: • **Principle** — The principal switch as defined in FC-SW • **Subordinate** — This switch is enabled and is a subordinate switch • **Disabled** — The switch is disabled
switchDomain	The domain ID of this switch: 0 to 31 or 1 to 239
switchID	The domain ID of this switch's embedded port: hex fffc00 to fffc7f
switchWwn	The WWN of this switch; the WWN is a unique identifier for each switch and is assigned by the manufacturer: a numbering scheme administrated globally ensures that this WWN is unique to each switch
Port Number	One line per port is printed after the switch summary; each line shows the port number: 0 to 15, the GBIC type, the port state and a comment field
GBIC type	The GBIC type follows the port number; the five GBIC types include: **--** — No GBIC present **sw** — Shortwave GBIC **lw** — Longwave GBIC **cu** — Copper GBIC **id** — Serial ID

Table 4-17. switchShow Command Field Descriptions *(continued)*

Field	Description
Port state	The port state follows the GBIC type; the possible port states include: • **No_Card** — No card present in this switch slot • **No_Module** — No GBIC module in this port • **No_Light** — The module is not receiving light • **No_Sync** — The module is receiving light but is out of sync • **In_Sync** — The module is receiving light and is in sync • **Laser_Flt** — The module is signaling a laser fault (defective GBIC) • **Port_Flt** — The port has been marked faulty (defective GBIC, cable, or device) • **Diag_Flt** — The port failed diagnostics (defective G_Port or FL_Port card or system board) • **Online** — The port is up and running • **Lock_Ref** — The port locking to the reference signal • **Testing** — Running diagnostics
Comment field	The comment field follows the port state. The possible comments include: • **Disabled** — The port is disabled • **Loopback** — The port is in loopback mode • **E_Port** — The WWN and switch name of the other switch is shown, the use of this Inter Switch Link (ISL) is shown (see FC_SW) • **F_Port** — The WWN of the N_Port is shown • **G_Port** — The port is online but is not yet an E_Port or F_Port • **L_Port** — The port is connected to an arbitrated loop

syslogdIp

The **syslogdIp** command sets or displays the switches system log daemon IP address. The command syntax is `syslogdip <ip address>.`

tempShow

The following example shows the **tempShow** command screen, which shows the switch's temperature as measured by five sensors on the system board.

```
switch:admin> tempShow
 31   27   28   27   33  Centigrade
 87   80   82   80   91  Fahrenheit
```

uptime

The **uptime** command can be used to display the amount of time the switch has been in operation (also known as up time), the total cumulative amount of up time since the switch was first powered-on, the date and time of the last reboot, and the reason for the last reboot.

For up and powered-on times less than 60 seconds, the display granularity is by the second. For times greater than 60 seconds, the display granularity is by the minute. In addition, the formatting of the output adjusts based on the amount of time. See Appendix A, "Error Messages," for more information.

version

The following example shows the **version** command screen, which displays firmware version information and build dates. The fields are described in Table 4-18.

```
switch:admin> version
VxWorks version: 5.3.1
Firmware version: v2.0
Made on: Thu Nov 19 16:18:29 PST 1998
Flash:     Mon Dec 28 15:34:05 PST 1998
BootProm:  Thu Oct 1 13:34:29 PDT 1998
```

Table 4-18. version Command Field Descriptions

Field	Description
VxWorks version	VxWorks operating environment version used on the processor
Firmware version	Switch firmware version
Made on	Firmware release date and time
Flash	The build date of the firmware stored in flash memory
BootProm	The build date of the firmware stored in the boot PROM

License Commands

License commands are reserved for use by Dell only.

Routing Commands

Routing commands allow you to view switch routing information.

bcastShow

The following example shows the **bcastShow** command screen, which displays broadcast tree information, and all ports that are currently transmitting and receiving broadcast frames. This command is used to understand routes the broadcast frames take through the fabric.

The fields are described in Table 4-19. A bit set indicates that the corresponding port belongs to a specific set. For instance, the bitmap value 0x00010003 means that port 0, port 1 and port 16 (the embedded port) are members of the set.

```
switch:admin> bcastShow

Group   Member Ports    Member ISL Ports        Static ISL Port

-------------------------------------------------------------------
 256     0x00000100        0x00000000              0x00000000
```

Table 4-19. bcastShow Bitmap Field Descriptions

Bitmap Field	Description
Group	The multicast group.
Member ports	All ports currently transmitting or receiving broadcast frames.
Member ISL Ports	Ports that belong to the interswitch broadcast distribution tree, as selected by the dynamic broadcast path selection protocol. These are all E_Ports, and this set is a subset of m_port. Broadcast frames use these ports to reach all fabric switches and to enter into the switch. Some of the E_Ports on a switch may not be part of this set, since the broadcast paths must constitute a tree.
Static ISL ports	Ports that belong to the interswitch broadcast distribution tree, as configured through the shell. This field is normally 0x00000000.

fspfShow

The following example shows the **fspfShow** command screen, which displays Fibre Channel Shortest Path First (FSPF) information. The fields are described in Table 4-20.

```
switch:admin> fspfShow

version         = 2
domainID        = 1
isl_ports       = 0x00000000
minLSArrival     = 3
minLSInterval   = 5
LSoriginCount    = 0
startTime        = 18656
fspfQ           = 0x10fa44e0
fabP            = 0x10fa4d60
agingTID        = 0x10f7e4c0
agingTo         = 10000
lsrDlyTID        = 0x10f6e4f0
lsrDelayTo       = 5000
lsrDelayCount    = 0
ddb_sem         = 0x10fa44b0

fabP:
event_sch       = 0x0
lsrRefreshCnt   = 0
```

Table 4-20. fspfShow Command Field Descriptions

Field	Description
version	The version of the FSPF protocol
domainID	The local switch's domain ID
isl_ports	A bitmap field that shows all local switch E_Ports
startTime	The time the FSPF started, in milliseconds from boot
other	The other fields represent internal FSPF variables

interfaceShow

The **interfaceShow** command displays FSPF interface information. This includes static information about the port (for example, variables allocated even when a port is down), and "neighbor" information which includes variables associated with the remote switch connected to the port. An FSPF interface corresponds to an E_Port. The static information fields are described in Table 4-21. Neighbor information fields are described in Table 4-22.

With no parameters, it shows the information for all switch interfaces. The command syntax is `interfaceShow <port #>`.

Table 4-21. interfaceShow Command Static Field Descriptions

Field	Description
idbP	The current neighbor state; its value must be NB_ST_FULL for the ISL to forward frames to the adjacent switch; other values may be transitory; however if a value is retained for more than ten seconds, contact Dell for technical assistance
nghbP	Neighbor capabilities has a value of 0
ifNo	The port number; it should be identical to the value specified in the command line
cost	The cost of sending a frame over the ISL connected to this port; the value 1000 indicates a 1-gigabits per second (Gbps) link
delay	The conventional delay incurred by a frame transmitted on this ISL; it is required by the FSPF protocol, and is a fixed value
lastScn	Last State Change Notification (SCN) received on this interface
lastScnTime	Time the last SCN was received
upCount	The number of times this interface initialized (the transition number from an offline to E_Port state)

Table 4-21. interfaceShow Command Static Field Descriptions *(continued)*

Field	Description
lastUpTime	Last time this interface came up.
downCount	Number of times this interface went down
lastDownTime	Last time this interface went down
downReason	Reason (SCN) for the interface going down
iState	The current interface state; it must be operational for the ISL to forward frames to the adjacent switch

Table 4-22. Neighbor Data Structure Field Descriptions

Field	Description
state	The current state of the neighbor; its value must be NB_ST_FULL for the ISL to forward frames to the adjacent switch
nghbCap	Neighbor capabilities; currently always 0
nghbId	The domain ID of the neighbor (adjacent) switch
idbNo	The port number; it should be equal to ifNo
remPort	The port number on the remote switch connected to this port
inactTo	The inactivity time out, in milliseconds (ms); when this timeout expires, the adjacency with the neighbor switch is considered broken; when that happens, new paths are computed to all the possible destination switches in the fabric
helloTo	The Hello timeout; when this timeout expires, a Hello frame is sent to the neighbor switch through this port
rXmitTo	The retransmit timeout; it is used to reliably transmit topology information to the neighbor switch; if an acknowledgment is not received within **rXmitTo**, a frame is retransmitted
nCmdAcc	The total number of commands accepted from the neighbor switch; it includes Hellos, Link State Updates and Link State Acknowledges
nInvCmd	The number of invalid commands received from the neighbor switch; these are commands with a version higher than the one running on the local switch; the current version is 1 and there is no version 0
nHloIn	The number of Hello frames received from the neighbor switch
nInvHlo	The number of Hello frames with invalid parameters received from the neighbor switch

Table 4-22. Neighbor Data Structure Field Descriptions *(continued)*

Field	Description
nLsuIn	The number of Link State Updates received from the neighbor switch
nLsaIn	The number of Link State Acknowledges received from the neighbor switch
attHIoOut	The number of attempted transmissions of Hello frames to the neighbor switch
nHIoOut	The number of Hello frames transmitted to the neighbor switch
attLsuOut	The number of attempted transmissions of Link State Updates to the neighbor switch
nLsuOut	The number of Link State Updates transmitted to the neighbor switch
attLsaOut	The number of attempted transmissions of Link State Acknowledges to the neighbor switch
nLsaOut	The number of Link State Acknowledges transmitted to the neighbor switch
other	The other fields represent internal FSPF variables

iodReset

The **iodReset** command turns off the in-order delivery option. This command allows out-of-order delivery of frames during fabric topology changes.

This is the default behavior and allows fast rerouting after a fabric topology change.

iodSet

The **iodSet** command ensures that frames are not delivered out-of-order, even during fabric topology changes. In a stable fabric, frames are always delivered in order, even when the traffic between switches is shared among multiple paths. However, when some topology change occurs in the fabric, for instance, a link goes down, traffic is rerouted around the failure. In general, there is no guarantee in this case that some frame, queued behind a congested link, will not be delivered after a frame that has been transmitted later, but is now taking the new path.

This command should be used with care, because it causes a delay in the establishment of a new path when a topology change occurs. Use this command only if there are devices connected to the fabric that do not tolerate occasional out-of-order delivery of frames.

The default behavior is for the in-order delivery option to be off.

LSDbShow

The **LSDbShow** command displays domain Link State Database entries. The database record for any fabric switch can be displayed from any switch. It also gives the same information regardless of switch used to run it (unless there is a database update in progress, which occurs every 30 minutes in a stable network).

Every switch keeps a database of topology information associated with itself and the other fabric switches. The topology information for a switch consists of all neighbors that are in NB_ST_FULL state and the associated port numbers.

This replicated database remains in sync at all times, so that every switch in the fabric has the same topology view. The topology database, in turn, is used to compute the path from a switch to all other fabric switches.

With no parameters, the command shows all the Link State Records in the database. The fields are described in Table 4-23.

The command syntax is `LSDbShow <domain ID>`.

Table 4-23 describes LSDbShow command fields.

Table 4-23. LSDbShow Command Field Descriptions

Field	Description
self	Indicates that domain 1 is the local switch's domain ID.
installTime	This is the database entry for domain 1. The installTime is the time when this database record was installed in milliseconds from boot. Values are in hexadecimal and decimal format.
lsAge	The record age in seconds since installation time. Records are refreshed throughout the fabric every 30 minutes, and this value should never exceed 3600. When lsAge reaches the value 1800, the record is flushed from the fabric if the switch that is described by the LSR is functioning and is connected to the fabric.
options	Options is currently set to 0.
lsId	The record's Link State ID, equal to the switch's domain ID as described by the record.
incarn	The incarnation number. When a record is refreshed, every 30 minutes, its incarnation number is incremented by 1. If data in the record changes (for example, if an E_Port on a switch goes offline), the switch described by that record issues a new instance, and increments the incarnation number by 1.
length	The total record length.
chksum	The record checksum. It includes all fields except lsAge.

Table 4-23. LSDbShow Command Field Descriptions *(continued)*

Field	Description
linkCnt	The link count, is the number of neighbors in NB_ST_FULL state that are adjacent to the switch described by this record. The linkCnt field is followed by a number of lines equal to the link count.
output port	Output port is the ISL port number connecting the neighbor switch.
linkID	The neighbor switch's domain ID.
rem port	The port on the remote switch that the local port (out port) is connected to.
costCnt	The cost of sending a frame over the ISL connected to this port. It is the same value as the cost in the neighbor data structure of the switch described by this record. It is always 0.
type	Always 1.

mcastShow

The **mcastShow** command, without parameters, displays multicast tree information for all the multicast groups. With a parameter (group number), it displays information about one multicast group only.

nbrStateShow

The **nbrStateShow** command displays neighbor's summary information. This information can also be retrieved using **interfaceShow.** The command provides essential information to determine the fabric topology in a concise way. By using this command, you can discover the domain ID of all switches adjacent to the local switch, and the port number on the local and remote switch. The fields are described in Table 4-24.

With no parameters, it displays the neighbor's state summary for all the neighbors instead of a neighbor connected to port 0 only.

The command syntax is `nbrStateShow` to list all neighbors.

The command syntax is `nbrStateShow <port #>` to list the neighbor on the specified port.

Table 4-24. nbrStateShow Command Field Descriptions

Field	Description
Local Port	Corresponds to idbNo in the neighbor data structure
Domain	Corresponds to nghbld in the neighbor data structure
Remote Port	Corresponds to remPort in the neighbor data structure

Table 4-24. nbrStateShow Command Field Descriptions *(continued)*

Field	Description
State	The neighbor's current state; its value must be NB_ST_FULL for the ISL to forward frames to the adjacent switch; other values may be transitory, however if a value is retained for more than ten seconds, contact Dell for technical assistance

routeHelp

The following example shows the **routeHelp** command screen, which displays the routing help commands.

```
switch:admin> routeHelp

bcastShow           Print broadcast tree information
fspfShow            Print FSPF global information
interfaceShow       Print FSPF interface information
iodReset            Turns off the in-order delivery option
iodSet              Turns on the in-order delivery option
LSDbShow            Print Link State Database entry
mcastShow           Print multicast tree information
nbrStateShow        Print neighbor's summary information
topologyShow        Print paths to domain(s)
uRouteConfig        Configure static unicast route
uRouteRemove        Remove static unicast route.
uRouteShow          Print port's unicast routing info
```

topologyShow

The **topologyShow** command displays all paths to a domain including:

- Output port(s) used to route frames to the domain
- The routing cost to reach the domain
- The input ports routed through the output port

The FSPF protocol supports equal cost multipaths, so there could be multiple parallel paths between two switches.

The command syntax is `topologyShow` to list all domains.

The command syntax is `topologyShow <domain ID>` to list the specified domain.

The following is an example of the **topologyShow** command screen.

```
switch:admin> topologyShow 1

Local Domain ID: 3

Domain   Metric Hops Out Port In Ports    Flags Name
-----------------------------------------------------------------
   1     2000     2      2      0x00000050 D   "open148"
                 2      1      0x00000020 D
                 2      0      0x00000080 D
```

uRouteConfig

The **uRouteConfig** command allows you to select the destination traffic's path on a source-port basis, as shown in the following screen example:

```
admin>uRouteConfig <port>, <domain>, <output port>
```

After using this command, traffic coming in from the port addressed to a domain is forwarded through the output port. Make sure that the output port is a viable path for reaching the domain.

The port can be an E_Port or an F_Port. If it is an E_Port, make sure that no routing loops are created.

If the output port is not an E_Port, the route is allocated dynamically to a different path, if one is available, as if this was a regular route. If the output port goes down, the route is treated as a regular route and is allocated to a different path, again, if one is available. When the output port comes back up, the port is rerouted back to the static route.

Load sharing continues, taking into account static routes when counting the number of routes that are allocated to a path, acting only on regular, non-static routes.

If port has a static route, the **flags** field in **uRouteShow** is set to **S** instead of **D**. Note that this does not affect the **flags** field in the **topologyShow** command. The latter still shows **D** unless a static path is configured.

The following example shows the **uRouteConfig** command screen:

```
switch:admin>uRouteConfig 2,2,4
committing configuration . . . done.
```

uRouteRemove

The **uRouteRemove** command removes the previous static route configuration, as shown in the following example:

```
switch:admin>uRouteRemove <PORT>, <DOMAIN>
```

uRouteShow

Table 4-25 shows the **uRouteShow** command, which displays the port's unicast routing information, which is the output port used to forward frames to the domain. Only one output port is used to forward frames from one input port to a destination domain.

The command `uRouteShow` now has three different syntax options:

- `uRouteShow <port #>, <domain ID>` — displays the route for port to domain
- `uRouteShow <port #>` — displays the route for port to all the active domains in the fabric
- `uRouteShow` — displays the route for all the ports on the switch to all the active domains in the fabric

In addition, in all three formats **uRouteShow** shows for each route, the domain ID of the next hop, and the port number on the next hop.

```
switch:admin> uRouteShow

Local Domain ID: 1

In Port    Domain    Out Port    Metric    Hops    Flags    Next (Dom, I
-------------------------------------------------------------------------
   0          5          7        1000       1       D           5,6
              6          7        2000       2       D           5,6
              7          7        3000       3       D           5,6
              8          7        4000       4       D           5,6
              9          7        5000       5       D           5,6

   1          5          5        1000       1       D           5,5
              6          5        2000       2       D           5,5
              7          5        3000       3       D           5,5
              8          5        4000       4       D           5,5
              9          5        5000       5       D           5,5

   2          5          4        1000       1       D           5,4
              6          4        2000       2       D           5,4
              7          4        3000       3       D           5,4
              8          4        4000       4       D           5,4
              9          4        5000       5       D           5,4

value = 1 = 0x1
```

Figure 4-25. uRouteShow Command Example

CHAPTER 5
Troubleshooting

This chapter discusses troubleshooting, diagnostic testing, and error messages, including the following sections:

- Diagnostic overview
- Status and activity indicators
- Diagnostic tests

Refer to the *Dell PowerVault Systems Storage Area Network (SAN) Installation and Troubleshooting Guide* for further troubleshooting information.

Diagnostic Overview

The switch is designed for maintenance-free operation. When there is a suspected failure, the switch has self-diagnostic capabilities to aid in isolating any equipment or fabric failures.

The switch supports power-on self-tests (POSTs) and diagnostic tests. The diagnostic tests determine the switch's status and isolate problems.

Telnet commands are used to determine the switch's status, error conditions, and switch operating statistics.

Diagnostic Error Messages

Error messages are available both by way of the switch's front panel LCD display and through a Telnet session. These messages are also stored in the system log and are displayed when the **errShow** command is executed.

If you run the **portStatsShow** or the **diagShow** command prior to running a test on the switch, errors may appear as a result of the normal synchronization process. These errors should be addressed if the number of errors found increases when running the **portStatsShow** command again.

Where multiple probable cause and corrective actions are listed following an error message, they are listed with the most probable first and the least probable last.

If any port fails during a diagnostic test, it is marked `BAD` in the status display and is ignored (not tried) until the system is rebooted.

To retest a port which has been marked `BAD`, clear the port and set to `OK` using the **diagClearError** *<port #>* command. This command clears the port status only and does not clear the logs or change the port's condition. The **diagClearError** *<port #>* command should only be used during diagnostic procedures to reset a bad port for retest.

For more detailed error message information, see Appendix A, "Error Messages."

Issuing Telnet Commands

Telnet commands (see Chapter 4, "PowerVault 56F 16-Port Fibre Channel Switch Commands") are available to determine the switch's status, error conditions, and switch operating statistics.

The diagnostic procedures are completed using commands during a **Telnet** session.

Isolating a System Fault

Various loopback paths are built into the switch hardware for diagnostic purposes. A loopback path test within the switch verifies the proper internal Fibre Channel Port (FCP) logic functions and the paths between the interfaces and central memory.

Removing Power

Error messages are stored in RAM and are lost when power is removed from the switch. Access the error message log to view and note any error messages before removing power from the switch.

Status and Activity Indicators

The following status activity indicators apply to G_Port and FL_Port interface cards.

NOTE: FL_Port interface cards have an additional green light-emitting diode (LED) (visible from the front of the switch) to identify them from G_Port interface cards.

Front-Panel LED Power Indicators

The color and flash speed of the power LED, as described in Table 5-1, indicates the switch's status.

Table 5-1. Front-Panel LED Power Indicators

Front-Panel LEDs	Definition
No light showing	Power not applied.
Steady power LED	Normal power-on indicator.
Flashing power LED	Switch failed POST and is not functioning, although power is applied.

Front-Panel LED Port Indicators

The color and flash speed of each port's LED, as described in Table 5-2, indicates the individual port's status.

Table 5-2. Front-Panel LED Port Indicators

Front-Panel LEDs	Definition
No light showing	No light or signal carrier (no module, no cable) for media interface LEDs
Steady yellow	Receiving light or signal carrier, but not yet online
Slow yellow	Disabled (result of diagnostics or **portDisable** command); flashes every 2 seconds
Fast yellow	Error, fault with port; flashes every 1/2 second
Steady green	Online (connected with device over cable)
Slow green	Flashes every 2 seconds; interswitch link; the port is physically online, but the fabric remains segmented due to an incompatable switch or switch firmware
Fast green	Internal loopback (diagnostic); flashes every 1/2 second
Flickering green	Online and frames flowing through port

Initialization Steps

At power-on or reset, the following steps are executed:

1. Preliminary POST diagnostics.
2. VxWorks operating system initialization.
3. Hardware initialization (resets, internal addresses assigned to G_Port and FL_Port ASICs, serial port initialized, front panel initialized).
4. Full POST.
5. Universal port configuration.
6. Link initialization; receiver/transmitter negotiation to bring connected ports online.

7. Fabric analysis; the switch checks for ports connected to other fabric elements. If there are other fabric elements connected, it identifies the master switch.

8. Address assignment; after the master switch is identified, port addresses may be assigned. Each switch tries to keep the same addresses that were previously used. These are stored in the switch's configuration flash programmable read-only memory (PROM).

9. Routing table construction; after addresses are assigned, the Unicast routing tables are constructed.

10. Enable normal N_Port operation.

Power-On Diagnostics

When powering-on a switch, the switch conducts a series of diagnostic tests on the following system functions:

- Dynamic RAM
- Port register
- Central memory
- CMI connector
- CAM
- Port loop back

If the switch fails to complete POST successfully, the green power LED is set to blink. This is an indication of a fault in one of the initial stages of POST and indicates that the microprocessor is not able to bring up the operating environment. If this condition occurs, the switch should be returned for repair.

If the switch can completely boot the operating system, but other errors are encountered during POST, these errors are logged in the system error log. A Telnet session or serial link connection to the switch enables viewing of the error log.

NOTE: A switch boot failure indicates the switch must be taken off-line to be either repaired or replaced.

Diagnostic Tests

The following tests are available from the switch's front panel and by way of **Telnet.** For details on how to use the switch's front panel buttons and how to access the Test Menu from the front panel, see "Managing Through Front Panel Buttons," found in Chapter 3.

NOTE: Accessing the switch by way of Telnet provides a more detailed response indicating the switch's condition and allows the use of some commands which do not have an equivalent front panel command.

NOTICE: Running diagnostic tasks on a switch routing traffic can cause disruption. Use the diagnostic tests only under direction of a Dell support technician.

Test Menu

Press <Enter> while the Test Menu is displayed on the switch's front panel; this action allows you to select the operations in the following section.

NOTE: See Appendix A, "Error Messages" for the actual error message descriptions.

Table 5-3. Offline and Online Test

Offline Tests	Offline and Online Tests
portRegTest	ramTest
centralMemoryTest	crossPortTest
cmiTest	
sramRetentionTest	
cmemRetentionTest	
camTest	
portLoopbackTest	
spinSilk	

Switch Offline

Pressing <Enter> at the **Switch Offline** window displays a prompt asking if you want the switch offline. Click either **Yes** or **No**.

Tests that would jeopardize data transmission require taking the switch offline. If the switch is not offline, a prompt appears before the test is allowed to proceed.

Switch Online

Pressing <Enter> at the **Ram Test** window displays a prompt asking if you want the switch online. Click either **Yes** or **No**.

After the switch is online, proceed with the test.

RAM Test

Pressing <Enter> while the **RAM Test** window displays either an error message or a message that the `ramTest passed`.

An error message would look similar to the following example:

```
DIAG-MEMORY,DIAG-MEMSZ,DIAG-MEMNULL
```

Port Register Test

Pressing <Enter> while the **Port Register Test** window is selected displays a reminder to take the switch offline if it is not offline. If the message is displayed, take the switch offline.

Pressing <Enter> starts the test, which checks the switch's ASIC registers. The ports tested are ports 0 through 15.

If the test is successful, the window displays `RegTest passed`.

An error message would look similar to the following example:

```
DIAG-REGERR,DIAG-REGERR_UNRST,DIAG-BUS_TIMEOUT
```

Central Memory Test

The **centralMemoryTest** verifies that the central memory in each Loom ASIC is functioning correctly by checking the following:

- The built-in-self-repair (BISR) circuit in each loom chip does not report failure to repair bad cells.
- The data cells can be uniquely written and read correctly (data write/read test).
- The data in any ASIC can be read from any other ASIC (loom connection test).
- Bad parity can be detected and flagged in the error register and interrupt posted (buffer number error test).
- Chip number error can be detected and flagged in the error register and interrupt posted (chip number error test).

Pressing <Enter> while **Central Memory Test** is selected displays a reminder to take the switch offline, if it is not offline. If the message is displayed, take the switch offline.

If the switch passes the test, `Passed` is displayed.

An error message would look similar to the following example:

```
DIAG-CMBISTRO,DIAG-CMBISRF,DIAG-LCMTO,DIAG-LCMRS,DIAG-
LCMEM,DIAG-LCMEMTX,DIAG-CMNOBUF,DIAG-CMERRTYPE,DIAG-CMER-
RPTN,DIAG-PORTABSENT,DIAG-BADINT,DIAG-TIMEOUT,DIAG-
INTNOTCLR
```

CMI Conn Test

The **cmiTest** verifies that control messages can be correctly sent from any ASIC to any ASIC. It also tests that the **checksum** check is OK. The switch must be offline.

An error message would look similar to the following example:

```
DIAG-BADINT,DIAG-INTNIL,DIAG-CMISAI, DIAG-CMINOCAP,DIAG-
CMINVCAP,DIAG-CMIDATA,DIAG-CMICKSUM
```

CAM Test

The **camTest** verifies that the SID translation required by QuickLoop and implemented using content addressable memories (CAM) is functioning correctly. The switch must be offline.

An error message would look similar to the following example:

```
DIAG-CAMINIT,DIAG-CAMSID,DIAG-XMIT
```

Port Loopback Test

The **portLoopbackTes**t verifies the intended functional operation of the switch by sending frames from each port's transmitter back to the same port's receiver by way of an internal hardware loopback.

Pressing <Enter> while the **portLoopbackTest** window is selected displays a reminder to take the switch offline, if it is not offline. If the message is displayed, take the switch offline.

The **portLoopbackTest** is an internal test which continues to run until you press any button. While the test is running, all GBIC module front panel LEDs rapidly flicker green indicating that the test is finding no errors and is processing.

To stop the test, press any button and `Aborted` is displayed.

An error message would look similar to the following example:

```
DIAG-INIT,DIAG-PORTDIED,DIAG-XMIT,DIAG-TIMEOUT,DIAG-
ERRSTAT,DIAG-ERRSTAT,DIAG-STATS,DIAG-DATA,DIAG-PORTABSENT
```

Cross Port Test

The **crossPortTest** verifies the intended functional operation of the switch by sending frames from each port's transmitter by way of the GBIC and external cable and back to another port's receiver. It exercises the entire path of the switch.

Figure 5-1 is a recommended connection when executing the **crossPortTest** command. The cables need not be connected. A port can be connected to any port in the same switch provided the connection is of the same technology, meaning copper ports must connect to copper ports, SW ports to SW ports, and LW ports to LW ports.

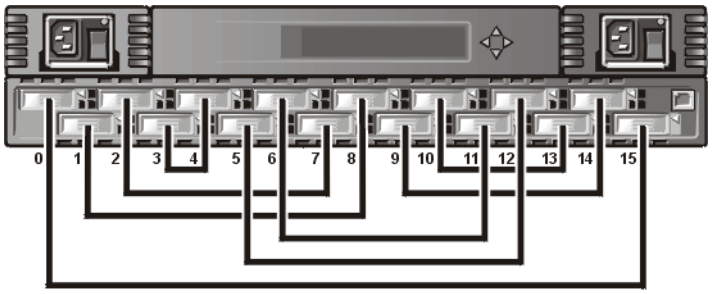


Figure 5-1. Switch Setup to Run Cross Port Test

NOTE: All ports on the switch must be connected or else the switch shows an error condition. When running the cross port test, you must set the operating mode value to 0 or 1. Modes 2 and 3 do not send out the ELP used to discover switches. If the ELP is not sent, the switch does not know the port is connected to another port on the same switch and the test fails.

If an error is encountered during the test, the error is displayed on either the front panel display or during the Telnet session.

An error message would look similar to the following example:

```
DIAG-INIT,DIAG-PORTDIED,DIAG-XMIT,DIAG-TIMEOUT,DIAG-
ERRSTAT,DIAG-STATS,DIAG-PORTWRONG,DIAG-DATA,DIAG-PORTABSENT
```

Spin Silk Test

The **spinSilkTest** verifies the intended functional operation of the switch by sending frames from each port's transmitter by way of the GBIC and external cable, and back to another port's receiver at the full hardware speed of 1-Gbps. It exercises the entire path of the switch. The switch must be offline.

Because the microprocessor is not comparing data on each frame as with the other two frame tests, the `DIAG-DATA` error is never reported during spin silk. However, the other error messages defined for **crossPortTest** and their corresponding messages probably causes actions that are applicable to the **spinSilkTest**.

Pressing <Enter> while **spinSilkTest** is selected displays a reminder to take the switch offline, if it is not offline. If the message is displayed, take the switch offline.

Pressing <Enter> starts the **Spin Silk Test** and displays the following message:

```
Spinsilk: Press any button to terminate
```

If an error is encountered during the test, the error is displayed on either the front panel display or by way of Telnet.

*NOTE: When running the **spinSilk Test,** you must set the operating mode value to 0 or 1. Modes 2 and 3 do not send out the ELP used to discover switches. If the ELP is*

not sent, the switch does not know the port is connected to another port on the same switch and the test fails.

An example error message would be similar to the following:

```
DIAG-INIT,DIAG-PORTDIED,DIAG-XMIT,DIAG-TIMEOUT,DIAG-
ERRSTAT,DIAG-STATS,DIAG-PORTWRONG,DIAG-DATA,DIAG-PORTABSENT
```

SRAM Data Retention Test

The **sramRetentionTest** verifies that data written into the ASIC memories are retained and that data bits to no *drop* when read after some amount of delay since the write. The switch must be offline.

An error message would look similar to the following example:

```
DIAG-REGERR,DIAG-REGERR_UNRST,DIAG-BUS_TIMEOUT
```

CMEM Data Retention Test

The **cmemRetentionTest** verifies that data written into the SRAMs that make up the central memory are retained and that data bits do not *drop* when read after some amount of delay since the write. The switch must be offline.

An error message would look similar to the following example:

```
DIAG-LCMEM,DIAG-LCMRS,DIAG-LCMTO
```

Display Test

Pressing <Enter> while **DisplayTest** is selected causes a test of characters to be displayed. Use this test to determine that the display is functioning properly.

Push Button Test

Pressing <Enter> while **PushButtonTest** is selected displays several button numbers. Pressing any front panel button causes the corresponding button number to move to the second line. To exit this test, simultaneously press 1 <Down> and 4 <Enter>.

CHAPTER 6
Repair and Replacement

This chapter covers the recommended and supported field repair and replacement for the PowerVault 56F 16-Port Fibre Channel switch.

Field Replaceable Units

For information regarding the following field replaceable units (FRU), see the following sections in this chapter:

- Power supply — "Replacing the Power Supply"
- Gigabyte interconnect (GBIC) module — "Replacing a GBIC Module"
- Fan tray assembly — "Replacing the Fan Assembly"
- System board — "Removing and Installing a System Board"
- Chassis assembly — "Replacing the Chassis"

Replacing the Power Supply

There are no user serviceable parts inside the power supply chassis.

WARNING: The power supplies in your computer or storage system may produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer covers and access any of the components inside the computer. This warning applies to Dell PowerEdge 4*xxx* or higher servers and Dell PowerVault 2*xx*S storage systems.

WARNING: This system may have more than one power supply cable. To reduce the risk of electrical shock, a trained service technician must disconnect all power supply cables before servicing the system.

Removing the Power Supply

To remove the power supply, you must perform the following steps.

CAUTION: When replacing a power supply unit on a PowerVault 56F storage system configured with one power supply, you must turn off the switch's power. For a PowerVault 56F storage system configured with dual power supplies, you do not need to turn off the active power supply before replacing the inactive power supply.

1. Remove any external cabling attached to the power supply.
2. Pull out and lift up the metal handle from the top of the power supply unit; see Figure 6-1.
3. Gently pull the unit out.

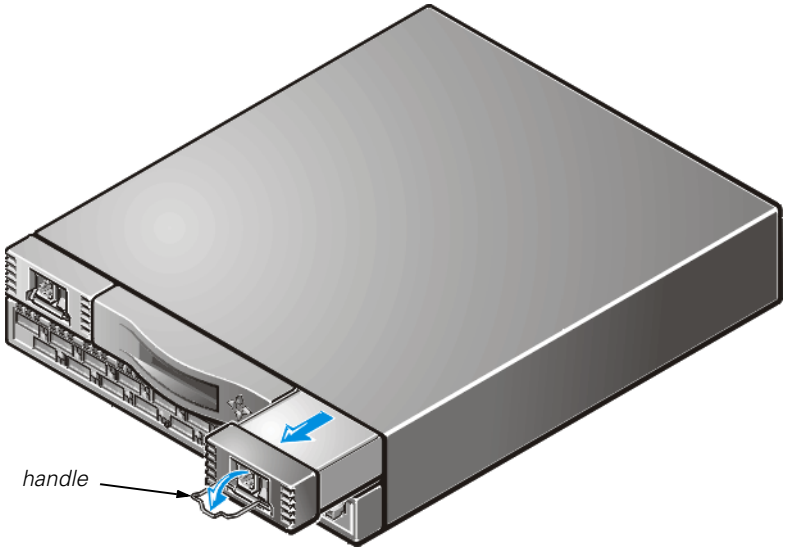


Figure 6-1. Removing the Power Supply

Installing the Power Supply

1. Slide the new power supply unit into its slot until the unit connects to the back panel.
2. Lock the metal handle into the power supply by pushing the handle down and sliding it up into place.
3. Reattach external cabling to the power supply.

   The switch automatically runs power-on self-test (POST) on a PowerVault 56F switch because all the power was off.
4. Check for error messages by issuing the **Telnet** command.

Replacing a GBIC Module

GBIC modules are installed and removed by inserting them into the system board from the front of the unit. Simple Network Management Protocol (SNMP) traps are generated upon GBIC insertion and removal.

Removing a GBIC Module

1. Pull down the metal swing bar on the front of the GBIC and pull it out, as shown in Figure 6-2.
2. Carefully wiggle the GBIC from side-to-side to unseat it.

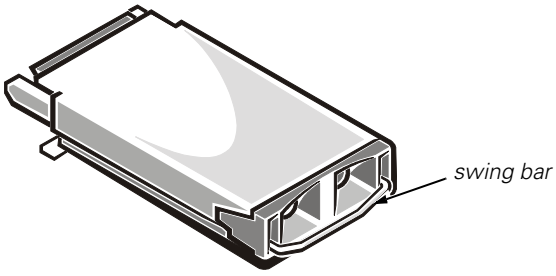


Figure 6-2. GBIC Module

If the module has squeeze prongs, squeeze the side prongs and carefully pull the GBIC out, as shown in Figure 6-3.

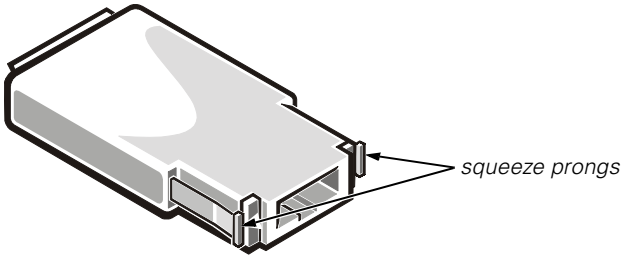


Figure 6-3. Squeeze Prongs on GBIC Module

Installing a GBIC Module

To install a GBIC module with squeeze prongs, insert the GBIC module into the port until its connector is firmly seated into the appropriate port. The latch prongs lock and prevent the GBIC's accidental removal.

NOTE: The GBIC module is keyed so it can be inserted in only one way. Do not force the insertion if the module does not slide in easily.

Replacing the Fan Assembly

Replacing the fan assembly involves removing the the existing fan assembly, and installing a new assembly.

NOTICE: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

You do not need to power off the switch during this replacement. The switch can safely run at the following temperatures while the fans are replaced:

- 25 minutes at 23 degrees C at sea level (average conditions)
- 4 minutes at 40 degrees C at three kilometers (km) altitude (extreme conditions)

Required Tools

#1 Phillips-head screwdriver

Removing the Fan Assembly

1. Loosen the four front thumb-screws.
2. Pull the assembly out of the switch as shown in Figure 6-4.

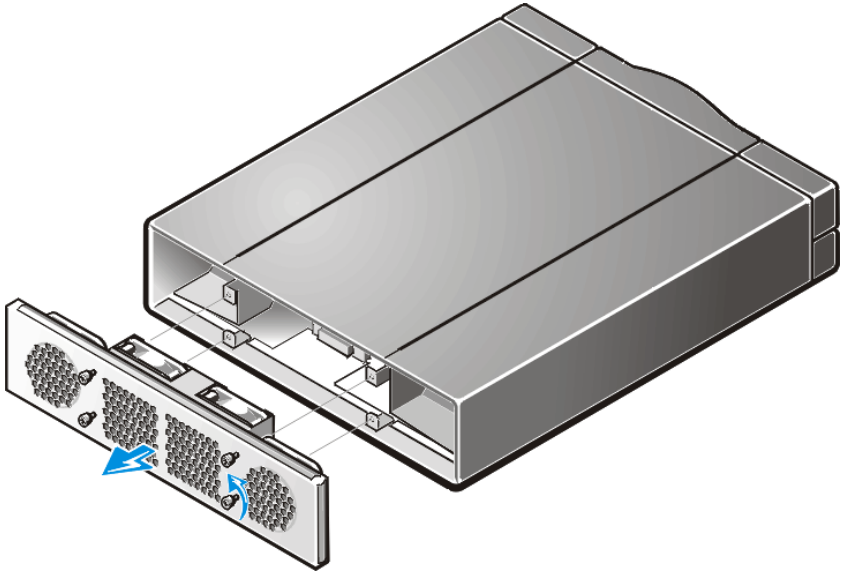


Figure 6-4. Removing the Fan Assembly

Installing a New Fan Assembly

1. Inset the new fan assembly into the switch's front assembly cavity.
2. Tighten the four front thumb-screws.

Removing and Installing a System Board

Replacing the system board involves removing the switch's cover, removing the system board, and installing the new system board.

NOTICE: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

Required Tools

#6 flat-head screwdriver

Removing the System Board

1. Remove all cabling attached to the front panel.
2. Remove all GBICs.

   See "Removing a GBIC Module" found earlier in this chapter for instructions.
3. Disconnect the power supply connector(s).
4. Remove the system board module by loosening the captured screw located between ports 7 and 9 and pulling the assembly out of the switch. See Figure 6-5.
5. Remove the new system board from its antistatic bag and place the old system board into the bag.

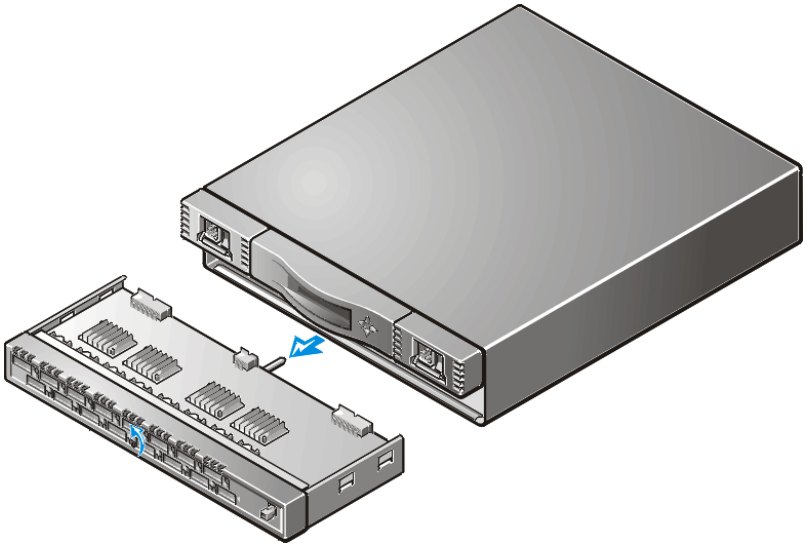


Figure 6-5. Removing the System Board

Installing a System Board

1. Insert the system board module into the switch's cavity and tighten the captured screw until the module is fully inserted.
2. Reconnect the power supply connector(s).
3. Reinstall the GBICs.

   See "Installing a GBIC Module" found earlier in this chapter for instructions.
4. Reconnect all external cabling.
5. Turn on the switch's power.

   The switch automatically runs POST.
6. Check for error messages by issuing the **Telnet** command.

Replacing the Chassis

Replacing the chassis involves removing the switch's GBICs, system board, power supply(s), fan assembly, and then reinstalling them into the new chassis assembly.

Required Tools

- #1 Phillips-head screwdriver
- #6 flat-head screwdriver

NOTICE: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

Removing the Switch Components

1. Remove all external cabling from the front panel.
2. Remove the power supplies.

   See "Removing the Power Supply," found earlier in this chapter for instructions.
3. Remove all GBICs.

   See "Removing a GBIC Module," found earlier in this chapter for instructions.
4. Remove the system board.

   See "Removing the System Board" found earlier in this chapter for instructions.
5. Remove the fan tray assembly.

   See "Removing the Fan Assembly," found earlier in this chapter for instructions.

Installing the New Switch Components

1. Install the system board.

   See "Installing a System Board," found earlier in this chapter for instructions.
2. Install the fan tray assembly.

   See "Installing a New Fan Assembly," found earlier in this chapter for instructions.
3. Replace the switch's cover.
4. Reinstall the GBICs.

   See "Installing a GBIC Module," found earlier in this chapter for instructions.
5. Install the power supply(s).

   See "Installing the Power Supply," found earlier in this chapter for instructions.
6. Turn on the switch's power.

   The switch automatically runs POST.
7. Check for error messages by issuing the **Telnet** command.

CHAPTER 7
Getting Help

This chapter describes the tools Dell provides to help you when you have a problem with your system. It also tells you when and how to call Dell for technical or customer assistance.

Technical Assistance

If you need assistance with a technical problem, perform the following steps:

1. Run the Dell Diagnostics.
2. Complete the troubleshooting checks in Chapter 5, "Troubleshooting."
3. Make a copy of the Diagnostics Checklist (found later in this chapter), and fill it out.
4. Use Dell's extensive suite of online services available at Dell's World Wide Web site (**http://www.dell.com**) for help with installation and troubleshooting procedures.

   For more information, refer to "World Wide Web" found later in this chapter.
5. If the preceding steps have not resolved the problem, call Dell for technical assistance.

   When prompted by Dell's automated telephone system, enter your Express Service Code to route the call directly to the proper support personnel. If you do not have an Express Service Code, open the **Dell Accessories** folder, double-click the **Express Service Code** icon, and follow the directions.

   NOTE: Dell's Express Service Code system may not be available in all countries.

   For instructions on using the technical support service, refer to "Technical Support Service" and "Before You Call" found later in this chapter.

Help Tools

Dell provides a number of tools to assist you. These tools are described in the following sections.

NOTE: Some of the following tools are not always available in all locations outside the continental U.S. Please call your local Dell representative for information on availability.

World Wide Web

The Internet is your most powerful tool for obtaining information about your system and other Dell products. Through the Internet, you can access most of the services described in this chapter, including AutoTech, TechFax, order status, technical support, and product information.

You can access Dell's support Web site at **http://support.dell.com**. To select your country, click the map that appears. The **Welcome to support.dell.com** page opens. Enter your system information to access help tools and information.

You can contact Dell electronically by using the following addresses:

- World Wide Web

  http://www.dell.com/

  http://www.dell.com/ap/ (for Asian/Pacific countries only)

  http://www.euro.dell.com (for Europe only)

  http://www.dell.com/la (for Latin American countries)

- Anonymous file transfer protocol (FTP)

  ftp.dell.com/

  Log in as `user: anonymous`, and use your e-mail address as your password.

- Electronic Support Service

  mobile_support@us.dell.com

  support@us.dell.com

  apsupport@dell.com (for Asian/Pacific countries only)

  support.euro.dell.com (for Europe only)

- Electronic Quote Service

  sales@dell.com

  apmarketing@dell.com (for Asian/Pacific countries only)

- Electronic Information Service

  info@dell.com

AutoTech Service

Dell's automated technical support service—AutoTech—provides recorded answers to the questions most frequently asked by Dell customers.

When you call AutoTech, you use your touch-tone telephone to select the subjects that correspond to your questions. You can even interrupt an AutoTech session and continue the session later. The code number that the AutoTech service gives you allows you to continue your session where you ended it.

The AutoTech service is available 24 hours a day, seven days a week. You can also access this service through the technical support service. For the telephone number to call, refer to "Dell Contact Numbers" found later in this chapter.

TechFax Service

Dell takes full advantage of fax technology to serve you better. Twenty-four hours a day, seven days a week, you can call the Dell TechFax line toll-free for all kinds of technical information.

Using a touch-tone phone, you can select from a full directory of topics. The technical information you request is sent within minutes to the fax number you designate. For the TechFax telephone number to call, refer to "Dell Contact Numbers" found later in this chapter.

TechConnect BBS

Use your modem to access Dell's TechConnect bulletin board service (BBS) 24 hours a day, seven days a week. The service is menu-driven and fully interactive. The protocol parameters for the BBS are 1200 to 19.2K baud, 8 data bits, no parity, 1 stop bit.

Automated Order-Status System

You can call this automated service to check on the status of any Dell products that you have ordered. A recording prompts you for the information needed to locate and report on your order. For the telephone number to call, refer to "Dell Contact Numbers" found later in this chapter.

Technical Support Service

Dell's industry-leading hardware technical-support service is available 24 hours a day, seven days a week, to answer your questions about Dell hardware.

Our technical support staff pride themselves on their track record: more than 90 percent of all problems and questions are taken care of in just one toll-free call, usually in less than 10 minutes. When you call, our experts can refer to records kept on your Dell system to better understand your particular question. Our technical support staff use system-based diagnostics to provide fast, accurate answers to questions.

To contact Dell's technical support service, first refer to the section titled "Before You Call" and then call the number for your country as listed in "Dell Contact Numbers" found later in this chapter.

Problems With Your Order

If you have a problem with your order, such as missing parts, wrong parts, or incorrect billing, contact Dell for customer assistance. Have your invoice or packing slip handy when you call. For the telephone number to call, refer to "Dell Contact Numbers" found later in this chapter.

Product Information

If you need information about additional products available from Dell, or if you would like to place an order, visit Dell's World Wide Web site at **http://www.dell.com/**. For the telephone number to call to speak to a sales specialist, refer to "Dell Contact Numbers found later in this chapter.

Returning Items for Warranty Repair or Credit

Prepare all items being returned, whether for repair or credit, as follows:

1. Call Dell to obtain an authorization number, and write it clearly and prominently on the outside of the box.

   For the telephone number to call, refer to "Dell Contact Numbers" found later in this chapter.

2. Include a copy of the invoice and a letter describing the reason for the return.

3. Include a copy of the Diagnostics Checklist indicating the tests you have run and any error messages reported by the Dell Diagnostics.

4. Include any accessories that belong with the item(s) being returned (power cables, software diskettes, guides, and so on) if the return is for credit.

5. Pack the equipment to be returned in the original (or equivalent) packing materials.

   You are responsible for paying shipping expenses. You are also responsible for insuring any product returned, and you assume the risk of loss during shipment to Dell. Collect-on-delivery (C.O.D.) packages are not accepted.

Returns that are missing any of the preceding requirements will be refused at our receiving dock and returned to you.

Before You Call

NOTE: Have your Express Service Code ready when you call. The code helps Dell's automated-support telephone system direct your call more efficiently.

Remember to fill out the Diagnostics Checklist (Figure 7-1). If possible, turn on your system before you call Dell for technical assistance and call from a telephone at or near the computer. You may be asked to type some commands at the keyboard, relay detailed information during operations, or try other troubleshooting steps possible only at the system itself. Make sure the system documentation is available.

CAUTION: If you need to remove the system covers, be sure to first disconnect the system's power and modem cables from all electrical outlets.

Diagnostics Checklist

Diagnostics Checklist

Name: _____Date: _____

Address: _____Phone number: _____

Service tag (bar code on the back of the computer): _____

Express Service Code: _____

Return Material Authorization Number (if provided by Dell support technician): _____

Operating system and version: _____

Peripherals: _____

_____

_____

Expansion cards: _____

_____

_____

Are you connected to a network? ☐ yes ☐ no

Network, version, and network card: _____

Programs and versions: _____

_____

_____

_____

Refer to your operating system documentation to determine the contents of the system's start-up files. If the computer is connected to a printer, print each file. Otherwise, record the contents of each file before calling Dell.

Error message, beep code, or diagnostic code: _____

Description of problem and troubleshooting procedures you performed: _____

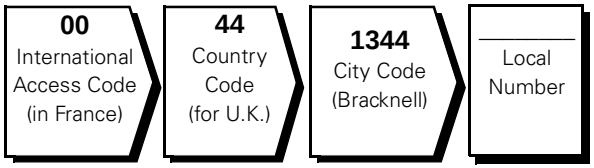
_____

_____

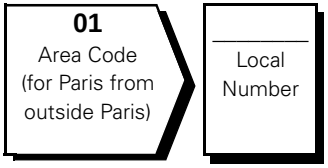
Figure 7-1. Diagnostics Checklist

Dell Contact Numbers

When you need to contact Dell, use the telephone numbers, codes, and electronic addresses provided in Table 7-1 and Table 7-2. Table 7-1 provides the various codes required to make long-distance and international calls. Table 7-2 provides local telephone numbers, area codes, toll-free numbers, Web site and e-mail addresses, if applicable, for each department or service available in various countries around the world. If you are making a direct-dialed call to a location outside of your local telephone service area, determine which codes to use (if any) in Table 7-1 in addition to the local numbers provided in Table 7-2. For example, to place an international call from Paris, France to Bracknell, England, dial the international access code for France followed by the country code for the U.K., the city code for Bracknell, and then the local number as shown in the following illustration.



To place a long-distance call within your own country, use area codes instead of international access codes, country codes, and city codes. For example, to call Paris, France from Montpellier, France, dial the area code plus the local number as shown in the following illustration.



The codes required depend on where you are calling from as well as the destination of your call; in addition, each country has a different dialing protocol. If you need assistance in determining which codes to use, contact a local or an international operator.

NOTE: Toll-free numbers are for use only within the country for which they are listed. Area codes are most often used to call long distance within your own country (not internationally)—in other words, when your call originates in the same country you are calling.

Table 7-1. International Dialing Codes

Country (City)	International Access Code	Country Code	City Code
Australia (Sydney)	0011	61	2
Austria (Vienna)	900	43	1
Belgium (Brussels)	00	32	2
Brazil	0021	55	51
Brunei	—	673	—
Canada (North York, Ontario)	011	—	Not required
Chile (Santiago)	—	56	2
China (Xiamen)	—	86	592
Czech Republic (Prague)	00	420	2
Denmark (Horsholm)	009	45	Not required
Finland (Helsinki)	990	358	9
France (Paris) (Montpellier)	00	33	(1) (4)
Germany (Langen)	00	49	6103
Hong Kong	001	852	Not required
Ireland (Bray)	16	353	1
Italy (Milan)	00	39	2
Japan (Kawasaki)	001	81	44
Korea (Seoul)	001	82	2
Luxembourg	00	352	—
Macau	—	853	Not required
Malaysia (Penang)	00	60	4
Mexico (Colonia Granada)	95	52	5
Netherlands (Amsterdam)	00	31	20
New Zealand	00	64	—
Norway (Lysaker)	095	47	Not required
Poland (Warsaw)	011	48	22
Singapore (Singapore)	005	65	Not required
South Africa (Johannesburg)	09/091	27	11

Table 7-1. International Dialing Codes *(continued)*

Country (City)	International Access Code	Country Code	City Code
Spain (Madrid)	07	34	91
Sweden (Upplands Vasby)	009	46	8
Switzerland (Geneva)	00	41	22
Taiwan	002	886	—
Thailand	001	66	—
U.K. (Bracknell)	010	44	1344
U.S.A. (Austin, Texas)	011	1	Not required

Table 7-2. Dell Contact Numbers

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Australia (Sydney)	Home and Small Business		1-300-65-55-33
	Government and Business		toll free: 1-800-633-559
	Preferred Accounts Division (PAD)		toll free: 1-800-060-889
	Customer Care		toll free: 1-800-819-339
	Corporate Sales		toll free: 1-800-808-385
	Transaction Sales		toll free: 1-800-808-312
	Fax		toll free: 1-800-818-341
Austria (Vienna) *NOTE: Customers in Austria call Germany for technical and customer assistance.*	Home/Small Business Sales	01	795 567602
	Home/Small Business Fax	01	795 67605
	Home/Small Business Customer Care	01	795 67603
	Preferred Accounts/Corporate Customer Care		0660 8056
	Home/Small Business Technical Support	01	795 67604
	Preferred Accounts/Corporate Technical Support		0660 8779
	Switchboard	01	491 04 0
	Web site: **http://support.euro.dell.com**		
	E-mail: tech_support_germany@dell.com		

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Belgium (Brussels)	Technical Support	02	481 92 88
	Customer Care	02	481 91 19
	Home/Small Business Sales		toll free: 0800 16884
	Corporate Sales	02	481 91 00
	Fax	02	481 92 99
	Switchboard	02	481 91 00
	Web site: **http://support.euro.dell.com**		
	E-mail: tech_be@dell.com		
Brazil	Sales, Customer Support, Technical Support		0800 90 3355
	Web site: **http://www.dell.com/br**		
Brunei *NOTE: Customers in Brunei call Malaysia for sales, customer, and technical assistance.*	Customer Technical Support (Penang, Malaysia)		810 4966
	Customer Service (Penang, Malaysia)		810 4949
	Transaction Sales (Penang, Malaysia)		810 4955
Canada (North York, Ontario) *NOTE: Customers in Canada call the U.S.A. for access to TechConnect BBS.*	Automated Order-Status System		toll free: 1-800-433-9014
	AutoTech (Automated technical support)		toll free: 1-800-247-9362
	Customer Care (From outside Toronto)		toll free: 1-800-387-5759
	Customer Care (From within Toronto)	416	758-2400
	Customer Technical Support		toll free: 1-800-847-4096
	Sales (Direct Sales—from outside Toronto)		toll free: 1-800-387-5752
	Sales (Direct Sales—from within Toronto)	416	758-2200
	Sales (Federal government, education, and medical)		toll free: 1-800-567-7542
	Sales (Major Accounts)		toll free: 1-800-387-5755
	TechConnect BBS (Austin, Texas, U.S.A.)	512	728-8528
	TechFax		toll free: 1-800-950-1329
Chile (Santiago) *NOTE: Customers in Chile call the U.S.A for sales, customer, and technical assistance.*	Sales, Customer Support, and Technical Support		toll free: 1230-020-4823

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
China (Xiamen)	Customer Service		toll free: 800 858 2437
	Sales		toll free: 800 858 2222
Czech Republic (Prague)	Technical Support	02	22 83 27 27
	Customer Care	02	22 83 27 11
	Fax	02	22 83 27 14
	TechFax	02	22 83 27 28
	Switchboard	02	22 83 27 11
	Web site: **http://support.euro.dell.com**		
	E-mail: czech_dell@dell.com		
Denmark (Horsholm) *NOTE: Customers in Denmark call Sweden for fax technical support.*	Technical Support		45170182
	Relational Customer Care		45170184
	Home/Small Business Customer Care		32875505
	Switchboard		45170100
	Fax Technical Support (Upplands Vasby, Sweden)		859005594
	Fax Switchboard		45170117
	Web site: **http://support.euro.dell.com**		
	E-mail: den_support@dell.com		
Finland (Helsinki)	Technical Support	09	253 313 60
	Technical Support Fax	09	253 313 81
	Relational Customer Care	09	253 313 38
	Home/Small Business Customer Care	09	693 791 94
	Fax	09	253 313 99
	Switchboard	09	253 313 00
	Web site: **http://support.euro.dell.com**		
	E-mail: fin_support@dell.com		

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
France (Paris/Montpellier)	Technical Support	0803	387 270
	Customer Care (Paris)	01	55 94 75 75
	Customer Care (Montpellier)	0825	08 23 83 03
	TechConnect BBS (Montpellier)	04	67 22 53 04
	Fax (Montpellier)	04	67 06 60 01
	Switchboard (Paris)	01	55 94 71 00
	Switchboard (Montpellier)	04	67 06 60 00
	Web site: **http://support.euro.dell.com**		
	E-mail: web_fr_tech@dell.com		
Germany (Langen)	Technical Support	06103	766-7200
	Technical Support Fax	06103	766-9222
	Home/Small Business Customer Care		0180-5-224400
	Global Segment Customer Care	06103	766-9570
	Preferred Accounts Customer Care	06103	766-9420
	Large Accounts Customer Care	06103	766-9560
	Public Accounts Customer Care	06103	766-9555
	TechConnect BBS	06103	766-9666
	Switchboard	06103	766-7000
	Web site: **http://support.euro.dell.com**		
	E-mail: tech_support_germany@dell.com		
Hong Kong *NOTE: Customers in Hong Kong call Malaysia for customer assistance.*	Technical Support		toll free: 800 96 4107
	Customer Service (Penang, Malaysia)		810 4949
	Transaction Sales		toll free: 800 96 4109
	Corporate Sales		toll free: 800 96 4108

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Ireland (Bray)	Technical Support		1-850-543-543
	Customer Care	01	204 4026
	Sales		1-850-235-235
	SalesFax	01	286 2020
	Fax	01	286 6848
	TechConnect BBS	01	204 4711
	TechFax	01	204 4708
	Switchboard	01	286 0500
	Web site: **http://support.euro.dell.com**		
	E-mail: dell_direct_support@dell.com		
Italy (Milan)	Technical Support	2	57782.690
	Customer Care	2	57782.555
	Sales	2	57782.411
	Fax	2	57503530
	Switchboard	2	57782.1
	Web site: **http://support.euro.dell.com**		
	E-mail: support_italy@dell.com		
Japan (Kawasaki)	Technical Support (Server)		toll free: 0120-1984-35
	Technical Support (Dimension™ and Inspiron™)		toll free: 0120-1982-56 or 0088-25-3355
	Technical Support (WorkStation, OptiPlex™, and Latitude™)		toll free: 0120-1984-39 or 0088-22-7890
	Y2K Support	044	556-4298
	Customer Care	044	556-4240
	Home and Small Business Group Sales	044	556-3344
	Preferred Accounts Division Sales	044	556-3433
	Large Corporate Accounts	044	556-3430
	Faxbox Service		03-5972-5840
	Switchboard	044	556-4300
	Web site: **http://support.jp.dell.com**		

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Korea (Seoul)	Technical Support		toll free: 080-200-3800
	Sales		toll free: 080-200-3777
	Customer Service (Seoul, Korea		2194-6220
	Customer Service (Penang, Malaysia)		604-810-4949
	Fax		2194-6202
	Switchboard		2194-6000
Latin America *NOTE: Customers in Latin America call the U.S.A. for sales, customer, and technical assistance.*	Customer Technical Support (Austin, Texas, U.S.A.)	512	728-4093
	Customer Service (Austin, Texas, U.S.A.)	512	728-3619
	Fax (Technical Support and Customer Service) (Austin, Texas, U.S.A.)	512	728-3883
	Sales (Austin, Texas, U.S.A.)	512	728-4397
	SalesFax (Austin, Texas, U.S.A.)	512	728-4600
			728-3772
Luxembourg *NOTE: Customers in Luxembourg call Belgium for sales, customer, and technical assistance.*	Technical Support (Brussels, Belgium)	02	481 92 88
	Home/Small Business Sales (Brussels, Belgium)		toll free: 080016884
	Corporate Sales (Brussels, Belgium)	02	481 91 00
	Customer Care (Brussels, Belgium)	02	481 91 19
	Fax (Brussels, Belgium)	02	481 92 99
	Switchboard (Brussels, Belgium)	02	481 91 00
	Web site: **http://support.euro.dell.com**		
	E-mail: tech_be@dell.com		
Macau *NOTE: Customers in Macau call Malaysia for customer assistance.*	Technical Support		toll free: 0800 582
	Customer Service (Penang, Malaysia)		810 4949
	Transaction Sales		toll free: 0800 581
Malaysia (Penang)	Technical Support		toll free: 1 800 888 298
	Customer Service	04	810 4949
	Transaction Sales		toll free: 1 800 888 202
	Corporate Sales		toll free: 1 800 888 213

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Mexico (Colonia Granada) *NOTE: Customers in Mexico call the U.S.A. for access to the Automated Order-Status System and AutoTech.*	Automated Order-Status System (Austin, Texas, U.S.A.)	512	728-0685
	AutoTech (Automated technical support) (Austin, Texas, U.S.A.)	512	728-0686
	Customer Technical Support	525	228-7870
	Sales	525	228-7811
			toll free: 91-800-900-37
			toll free: 91-800-904-49
	Customer Service	525	228-7878
	Main	525	228-7800
Netherlands (Amsterdam)	Technical Support	020	581 8838
	Customer Care	020	581 8740
	Home/Small Business Sales		toll free: 0800-0663
	Home/Small Business Sales Fax	020	682 7171
	Corporate Sales	020	581 8818
	Corporate Sales Fax	020	686 8003
	Fax	020	686 8003
	Switchboard	020	581 8818
	Web site: **http://support.euro.dell.com**		
	E-mail: tech_nl@dell.com		
New Zealand	Home and Small Business		0800 446 255
	Government and Business		0800 444 617
	Sales		0800 441 567
	Fax		0800 441 566
Norway (Lysaker) *NOTE: Customers in Norway call Sweden for fax technical support.*	Technical Support		671 16882
	Relational Customer Care		671 17514
	Home/Small Business Customer Care		23162298
	Switchboard		671 16800
	Fax Technical Support (Upplands Vasby, Sweden)		590 05 594
	Fax Switchboard		671 16865
	Web site: **http://support.euro.dell.com**		
	E-mail: nor_support@dell.com		

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Poland (Warsaw)	Technical Support	22	60 61 999
	Customer Care	22	60 61 999
	Sales	22	60 61 999
	Fax	22	60 61 998
	Switchboard	22	60 61 999
	Web site: **http://support.euro.dell.com**		
	E-mail: pl_support@dell.com		
Singapore (Singapore) *NOTE: Customers in Singapore call Malaysia for customer assistance.*	Technical Support		toll free: 800 6011 051
	Customer Service (Penang, Malaysia)	04	810 4949
	Transaction Sales		toll free: 800 6011 054
	Corporate Sales		toll free: 800 6011 053
South Africa (Johannesburg)	Technical Support	011	709 7710
	Customer Care	011	709 7710
	Sales	011	706 7700
	Fax	011	709 0495
	Switchboard	011	709 7700
	Web site: **http://support.euro.dell.com**		
	E-mail: dell_za_support@dell.com		
Southeast Asian/ Pacific Countries (excluding Australia, Brunei, China, Hong Kong, Japan, Korea, Macau, Malaysia, New Zealand, Singapore, Taiwan, and Thailand—refer to individual listings for these countries)	Customer Technical Support, Customer Service, and Sales (Penang, Malaysia)		60 4 810-4810

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Spain (Madrid)	Technical Support		902 100 130
	Corporate Customer Care		902 118 546
	Home/Small Business Customer Care		902 118 540
	TechConnect BBS	91	329 33 53
	Corporate Sales		902 100 185
	Home/Small Business Sales		902 118 541
	Switchboard	91	722 92 00
	Web site: **http://support.euro.dell.com**		
	E-mail: es_support@dell.com		
Sweden (Upplands Vasby)	Technical Support	08	590 05 199
	Relational Customer Care	08	590 05 642
	Home/Small Business Customer Care	08	587 70 527
	Fax Technical Support	08	590 05 594
	Sales	08	590 05 185
	Web site: **http://support.euro.dell.com**		
	E-mail: swe_support@dell.com		
Switzerland (Geneva)	Technical Support		0844 811 411
	Customer Care		0848 802 802
	Fax	022	799 01 90
	Switchboard	022	799 01 01
	Web site: **http://support.euro.dell.com**		
	E-mail: swisstech@dell.com		
Taiwan	Technical Support		toll free: 0080 60 1255
	Technical Support (servers)		toll free: 0080 60 1256
	Transaction Sales		toll free: 0080 651 228/0800 33 556
	Corporate Sales		toll free: 0080 651 227/0800 33 555
Thailand *NOTE: Customers in Thailand call Malaysia for customer assistance.*	Technical Support		toll free: 0880 060 07
	Customer Service (Penang, Malaysia)		810 4949
	Sales		toll free: 0880 060 09

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
U.K. (Bracknell)	Technical Support		0870-908-0800
	Corporate Customer Care	01344	720206
	Home/Small Business Customer Care		0870-906-0010
	TechConnect BBS		0870-908-0610
	Sales		0870-907-4000
	AutoFax		0870-908-0510
	Web site: **http://support.euro.dell.com**		
	E-mail: dell_direct_support@dell.com		

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
U.S.A. (Austin, Texas)	Automated Order-Status System		toll free: 1-800-433-9014
	AutoTech (Automated technical support)		toll free: 1-800-247-9362
	Dell Home and Small Business Group:		
	Customer Technical Support (Return Material Authorization Numbers)		toll free: 1-800-624-9896
	Customer Service (Credit Return Authorization Numbers)		toll free: 1-800-624-9897
	National Accounts (systems purchased by established Dell national accounts [have your account number handy], medical institutions, or value-added resellers [VARs]):		
	Customer Service and Technical Support (Return Material Authorization Numbers)		toll free: 1-800-822-8965
	Public Americas International (systems purchased by governmental agencies [local, state, or federal] or educational institutions):		
	Customer Service and Technical Support (Return Material Authorization Numbers)		toll free: 1-800-234-1490
	Dell Sales		toll free: 1-800-289-3355
			toll free: 1-800-879-3355
	Spare Parts Sales		toll free: 1-800-357-3355
	DellWare™		toll free: 1-800-753-7201
	DellWare FaxBack Service	512	728-1681
	Fee-Based Technical Support		toll free: 1-800-433-9005
	Sales (Catalogs)		toll free: 1-800-426-5150
	Fax		toll free: 1-800-727-8320
	TechFax		toll free: 1-800-950-1329
	TechConnect BBS	512	728-8528
	Dell Services for the Deaf, Hard-of-Hearing, or Speech-Impaired		toll free: 1-877-DELLTTY (1-877-335-5889)
	Switchboard		512338-4400

APPENDIX A
Error Messages

This appendix explains the error message format, error message by firmware module, and other possible errors.

Error Message Formats

There are two error message formats for the PowerVault 56F whether you are gathering information from the front panel or using a remote **Telnet** session. The front panel shows an abbreviated message and **Telnet** displays the entire error message.

In all cases, the last error encountered is the first error displayed. Up to 64 messages are held in a buffer. If the 64 message limit is exceeded, the messages are overwritten in a first in, first out sequence.

Telnet Message Formats

The **errShow** command displays all detected errors. The output provides additional information over the front panel display. The following information is displayed in Figure A-1:

- There are two errors which have been detected.
- The task ID and task name that incurred the error (task names are displayed using the **i** command).
- The error type, date and time, the error level, and description.
- If there is more than one occurrence of an error type, the number of occurrences is shown in brackets following the error level.

NOTE: The error counter goes to a maximum of 999.

The display halts after each error is displayed, prompting you to either press <Enter> to continue or type a **Q** to quit. Continue pressing <Enter> until the prompt => is displayed.

```
=> errShow

Error 02
--------
0x103dc470 (tSilkworm): Apr  9 10:41:06
    Error SENSOR-FAILED, 3, sensor 7 (Fan 2) is below mi

Type <CR> to continue, Q<CR> to stop:

Error 01
--------
0x103dc470 (tSilkworm): Apr  9 10:40:51
    Error DIAG-TIMEOUT, 1,
  Port 2 receive timeout.

Type <CR> to continue, Q<CR> to stop:
value = 1 = 0x1
```

Figure A-1. errShow Command Example

To display error messages by way of **Telnet**:

1. From the prompt, type `errShow`.
2. To scroll through the error list, type `CR`.
3. Scroll through the error log (if no errors were encountered, the message `No Error` appears).

Error Messages by Firmware Module

Table A-1 shows the error messages organized by module.

Table A-1. Errors

Module	Error Severity	Explanation	Action
Flood	INVLSR (3)	An unknown Link State Record has been received from a neighbor switch.	Check that all paths and routing tables are correct using the commands **uPathShow <domain>**, or **uPathAllShow**. If the paths are not correct reboot the neighbor switch that sent the wrong data. Check the paths and routes again. If they are still incorrect, reboot the local switch.
	LSRLEN (2)	The local switch is trying to create a Link State Update that exceeds the maximum length.	Check that all paths and routing tables are correct. If they are not, reboot the local switch.
FSPF	BADSRC (3)	The neighbor switch domain ID has changed, without the link going down.	The system automatically recovers.

Table A-1. Errors *(continued)*

Module	Error Severity	Explanation	Action
	INPORT (2)	The input port in the IU received by the path selection task is out of range.	Check that all paths and routing tables are correct. If they are not correct, reboot the local switch.
	MSG (2)	The path selection task has received an unknown message from another task.	Check that all paths and routing tables are correct. If they are not, reboot the neighbor switch. Check the paths and routes again. If they are still incorrect, reboot the local switch.
	REMDOMAIN (2)	The message received from a neighbor switch has a source domain ID out of range.	Check that all paths and routing tables are correct. If they are not, reboot the neighbor switch. Check the paths and routes again. If they are still incorrect, reboot the local switch.
	SCN (3)	The path selection task has received a State Change Notification message that it does not recognize.	Check that all paths and routing tables are correct. If they are not, reboot the local switch.
	VERSION (2)	The FSPF protocol version running on the local switch is lower than a neighbor's switch.	Check the protocol version on both switches using the **fspfShow** command. If the two versions differ, update the software on the local switch.
HLO	INVHLO (1)	The path selection task has received a HELLO message with an invalid parameter from a neighbor switch.	Check that all paths and routing tables are correct. If they are not, reboot the neighbor switch. Check the paths and routes again. If they are still incorrect, reboot the local switch.
LSDB	LSID (2)	A Link State Record received as part of a Link State Update has an out of range domain ID.	Check that all paths are correct. If any path is missing to any switch in any part of the fabric, reboot the switch with the missing path.
MCAST	ADDBRANCH (2)	A branch is being added to a broadcast or multicast tree, but the parameters are incorrect.	If this is caused by a configuration command, check the parameter values. Otherwise, check the broadcast tree with the **bcastShow** command. If the tree is incorrect, reboot the local switch.
	ADDPORT (3)	A multicast routing table programming failed.	Run the **portLogShow** command. Contact Customer Support.
	NOPARENT (2)	An error occurred while computing a broadcast or multicast tree.	Run the **LSDbAllShow** command. Contact Customer Support.
	NOPARENTLSR (2)	An error occurred while computing a broadcast or multicast tree.	Run the **LSDbAllShow** command. Contact Customer Support.

Table A-1. Errors *(continued)*

Module	Error Severity	Explanation	Action
	REMPORT (3)	Removing an entry from a multicast routing table failed.	Run the **portLogShow** command. Contact Customer Support.
	SPFCOST (3)	An error occurred with computing the multicast path tree.	Run the **LSDbAllShow** command. Contact Customer Support.
NBFSM	NGBRSTATE (2)	An error occurred in the neighbor Finite State.	Check the neighbor's state with the **nbrStateShow** command. If the state is not NB_ST_FULL, force a state change with the **portDisable** command followed by **portEnable**. After a few seconds, if the state is not NB_ST_FULL, reboot both the local and remote switches.
UCAST	ADDPATH (1)	A static path configuration failed.	Check command parameters.
	RELICPDB (2)	The path selection task received an E_Port SCN, but the port was already ISL.	Run the **ucastAllShow** command. Contact customer support.
	SPFCOST(3)	An error occurred with computing the unicast path tree.	Run the **LSDAllShow** command. Contact customer support.
MQ	QREAD (1)	A task was unable to receive a message.	Run the command **show <queue ID>** with the ID of the queue reported in the error. Contact customer support.
	QWRITE (1)	A task was not able to post a message on a queue.	See "MQ-QWRITE Error" found later in this chapter for more information.
SYS	NOMEM (1)	The system's memory is exhausted.	Reboot the switch. Contact customer support.
	SYSCALL (2)	A system call into VxWorks failed.	Reboot the switch. Contact customer support.
TIMERS	ENQFAIL (1)	An error occurred while setting a timer.	Reboot the switch. Run the commands **actTimersShow** and **timerShow <timer ID>**. Contact customer support.
	MSG (3)	The timer task received an unknown message.	Contact customer support.

Panic Errors

This module includes errors that cause a system panic to occur. A system panic causes the switch to reboot. The error is stored in flash memory with a stack trace, local stack content and local register content at the time the error occurred.

To view the trace, allow the switch to reboot and issue the **traceShow** command. If the trace was caused by an error, the first line displays:

```
Reset reasons 0x100: Panic
```

Panic errors have the highest severity (0).

*NOTE: Use the **traceShow** command to identify panic errors as the **errShow** command is not useful in this case.*

Panic errors are described in Table A-2.

Table A-2. Panic Errors

Error Severity	Explanation	Action
FREETIMRLSD (0)	A task freed an already free timer.	Issue the **traceShow** command. Contact customer support.
INCONSISTENT (0)	An internal inconsistency has been detected.	Issue the **traceShow** command. Contact customer support.
MALLOC (0)	The switch has run out of memory.	Issue the **traceShow** command. Contact customer support.
MSGQCREATE (0)	A message queue could not be created.	Issue the **traceShow** command. Contact customer support.
MSGQDELETE (0)	A message queue could not be destroyed.	Issue the **traceShow** command. Contact customer support.
SEMCREATE (0)	A semaphore could not be created.	Issue the **traceShow** command. Contact customer support.
SEMDELETE (0)	A semaphore could not be destroyed.	Issue the **traceShow** command. Contact customer support.
TASKSPAWN (0)	A task could not be created.	Issue the **traceShow** command. Contact customer support.
TIMEUSECNT (0)	A timer was not released after expiration.	Issue the **traceShow** command. Contact customer support.
ZOMTIMKILL (0)	An attempt was made to kill a timer that was in 'zombie' state.	Issue the **traceShow** command. Contact customer support.
ZOMTIMSET (0)	An attempt was made to set a timer that was in 'zombie' state.	Issue the **traceShow** command. Contact customer support.

MQ-QWRITE Error

The software includes several message queues that are used for inter-task communication. Each queue holds a maximum of 64 messages. Under normal operations, a task sends a message to another task on a queue, and occupies a slot in the queue. After the message is received, its slot in the queue is open for another message.

If the receiving task does not run for a period of time, and the sender task sends more than 64 messages to the same queue before the first message is processed by the receiving task, the queue overflows and the message is discarded. This event causes the `MQ-QWRITE` error to be printed on the display, as well as on the **Telnet** window, if open. The error is also stored in the error log which can be viewed with the **errShow** command.

NOTE: The error log is cleared upon reboot.

There may be several reasons for this error. In some cases, the system may recover without human intervention, however in most cases it will not. In some cases, the error can even indicate a task crash.

These problems can be diagnosed by technical support provided enough information is collected to allow a detailed analysis of the specific case.

The MQ-QWRITE error message is shown in Figure A-2 (the front panel displays an abridged version of the message).

```
Dell_FC_Switch# 0x103fce60 (tTimers): Oct 14 11:07:43
    Error MQ-QWRITE, 1, mqWrite failed,
     queue = 0x103d1d20, msg = 0x103fd3d0,
     errno = 0x3d0002
Traceback:
_mqWrite+0x44 (0x10065864)
_mPathAllShow+0x1158 (0x10078498)
```

Figure A-2. MQ-QWRITE Error Example

The most notable parameters are:

- The ID of the task that attempted to send the message (`tTimers` in Figure A-2)
- The queue ID (`0x103d1d20` in Figure A-2)
- The message pointer (`0x103fd3d0` in Figure A-2)

The following commands should be executed, and their output, together with the complete message log should be used when analyzing the error.

NOTE: Some of these commands can only be run from the root account.

Table A-3 describes `MQ-QWRITE` commands for gathering errors.

Table A-3. Commands to Gather MQ-QWRITE Error Information

Command	Description
`i`	Lists all the current tasks in the system. Most tasks should be in "READY" or "PEND" state. If any task is in "SUSPEND" state, then a task trace of that task should be run using the **tt** command.
`tt <task name>`	Shows the stack trace of the task.
`show <queue ID>`	Shows information about the queue that overflowed.
`d <msg pointer>,2,4`	Shows the content of the message.
`fspfShow`	Shows FSPF task's queue ID.
`portSemShow`	Shows tasks waiting on port semaphores.
`spy 5`	Shows per-task microprocessor utilization. This command displays a report every five seconds. At least two reports should be printed, since the first one indicates that the microprocessor is used by the shell.
`spyStop`	Stops microprocessor utilization monitoring. This command can be typed in at any time during the monitoring process.

For information on executing these commands, contact Dell for technical assistance.

Other Possible Errors

This section explains the other errors that may occur.

Fan Error Message

Table A-4 shows the fan error message.

Table A-4. Fan Error Message

Message	Explanation
`Please check the fans inside the switch box.`	Fan has stopped spinning

Port Error Messages

Table A-5 shows the port error messages:

Table A-5. Port Error Messages

Message	Explanation
`Please check the switch front panel for GBICs.`	The GBIC was removed from this port (solid black LED)
`There is no G_Port board or no GBIC module for this port.` `Please check the switch front panel.`	Port is receiving no signal (solid black LED)
`Cable is partially inserted in the port, or the device at the other end of the cable is not functioning properly.` `Please check the switch front panel or check the device on the other end of the cable.`	Port is receiving signal, but not yet online (solid amber LED)
`The port was disabled by an administrator manually via the front panel, or via one of the management tools.`	Port is disabled (slow flashing amber LED)

`One or more faulty conditions have occurred:`
`Laser_Flt: the module is signaling a laser fault (defective GBIC);`
`Port_Flt: the port has been marked faulty (defective GBIC, cable or device)`
`Diag_Flt: the port failed diagnostics (defective G_Port card or motherboard)`
	Port has a fault (fast flashing amber LED)

`The port is online and connected to a device over the cable.`	Port is OK (solid green LED)
`Port is online but segmented.`	Port is segmented (slow flashing green LED)

Table A-5. Port Error Messages

Message	Explanation
`The port is configured as a loop-back port by diagnostics to verify the proper functioning of the internal Fibre Channel port logic and paths between the interface and the central memory. portEnable will put the port back online again.`	Port has an internal loopback (fast flashing green LED)
`The port is online and transmitting/receiving frames.`	Port is sending data (flickering green LED)

Thermometer Error Message

Table A-6 show the thermometer error message.

Table A-6. Thermometer Error Message

Message	Explanation
`One or more temperature sensors have exceeded the minimum or maximum allowed temperature reading (Minimum temperature is zero degrees Centigrade, maximum is 75 degrees Centigrade).`	Temperature out of range

NOTE: Error messages are stored in volatile RAM and are lost whenever power is removed from the switch. Access the error message log to view error messages before removing power.

Front Panel Message Formats

The switch's front panel displays error messages, as shown in Figure A-3.

```
Mar 10 08:48:29
DIAG-Regerr UNRST-1
```

Figure A-3. Format of Front Panel Message

The first line includes the error's date and time. The beginning of each second line on the front panel display starts with the module name (`DIAG`), error name (`REGERR_UNRST`), and the severity level (`1`).

The possible security level values are:

- 1 — Critical
- 2 — Error
- 3 — Warning
- 4 — Informational
- 5 — Debug

NOTE: If the same error occurs within the same module (for example, the DIAG-REGERR_UNRST module) but on different ports, the number of occurrences for that message is incremented in brackets (up to 999), and the error number is not incremented (that is, though it may occur 999 times, it occupies one message in the 320 message buffer).

To display error messages from the front panel:

1. From the front panel, click the **Status** menu.
2. From the **Status** window, click **Error Log**.
3. Scroll through the error log. If no errors occur, the panel displays `No Error`.

Diagnostic Error Message Formats

If any port fails during a diagnostic test, it is marked `BAD` in the status display.

To retest a port which has been marked `BAD`, clear the port and set to `OK` using the **diagClearError *port#*** command. This command clears the port status only and does not clear the logs or change the port's condition.

Some messages contain the following abbreviations:

- **sb** — Should Be
- **er** — Bits in error

*NOTE: If you run the **portStatsShow** or the **diagShow** command prior to running a test, errors may appear as a result of the normal synchronization process. These errors should be addressed if the number of errors found increases when running the **portStatsShow** command again*

Table A-7 describes possible failure actions.

Table A-7. Probable Failure Actions

Failed Test	Action
ramTest	Replace mainboard assembly
portRegTest	Replace mainboard assembly
centralMemoryTest	Replace mainboard assembly
cmiTest	Replace mainboard assembly

Table A-7. Probable Failure Actions *(continued)*

Failed Test	Action
cmemRetentionTest	Replace mainboard assembly
sramRetentionTest	Replace mainboard assembly
camTest	Replace mainboard assembly
portLoopbackTest	Replace mainboard assembly
crossPortTest	Replace mainboard assembly, GBIC or fiber cable
spinSilk	Replace mainboard assembly, GBIC or fiber cable

Error Message Numbers

An error number `ERR#xxxx` appears at the end of an error message. Table A-9 matches each error number with the test that caused the error and the name of the error. Look up the complete definition of the error name and the actions that correct it in Table A-8.

Table A-8. Error Message Codes Defined

Error Number	Test Name	Error Name
001	N/A	DIAG-CLEAR_ERR
004	N/A	DIAG-POST_SKIPPED
0B15	sramRetentionTest	DIAG-REGERR
0B16		DIAG-REGERR_UNRST
0B0F		DIAG-BUS_TIMEOUT
1F25	cmemRetentionTest	DIAG-LCMARS
1F26		DIAG-LCMTO
1F27		DIAG-LCMEM
0110	ramTest	DIAG-MEMORY
0111		DIAG-MEMSZ
0112		DIAG-MEMNULL
0415	portRegTest	DIAG-REGERR
0416		DIAG-REGERR_UNRST
040F		DIAG-BUS_TIMEOUT

Table A-8. Error Message Codes Defined *(continued)*

Error Number	Test Name	Error Name
1020	centralMemoryTest	DIAG-CMBISRTO
1021		DIAG-CMBISRF
1025		DIAG-LCMRS
1026		DIAG-LCMTO
1027		DIAG-LCMEM
1028		DIAG-LCMEMTX
1029		DIAG-CMNOBUF
102A		DIAG-CMERRTYPE
102B		DIAG-CMERRPTN
102C		DIAG-INTNOTCLR
103O		DIAG-BADINT
106F		DIAG-TIMEOUT
2030	cmlTest	DIAG-BADINT
2031		DIAG-INTNIL
2032		DIAG-CMISA1
2033		DIAG-CMINOCAP
2034		DIAG-CMIINVCAP
2035		DIAG-CMIDATA
2036		DIAG-CMICKSUM
223B	camTest	DIAG-CAMINIT
223C		DIAG-CAMSID
2640	portLoopbackTest	DIAG-ERRSTAT (ENCIN)
2641		DIAG-ERRSTAT (CRC)
2642		DIAG-ERRSTAT (TRUNC)
2643		DIAG-ERRSTAT (2LONG)
2644		DIAG-ERRSTAT (BADOF)
2645		DIAG-ERRSTAT (ENCOUT)
2646		DIAG-ERRSTAT (BADORD)
2647		DIAG-ERRSTAT (DISCC3)

Table A-8. Error Message Codes Defined *(continued)*

Error Number	Test Name	Error Name
264F		DIAG-INIT
265F		DIAG-PORT_DIED
266E		DIAG-DATA
266F		DIAG-TIMEOUT
2660		DIAG-STATS(FTX)
2661		DIAG-STATS(FRX)
2662		DIAG-STATS(C3FRX)
2670		DIAG-PORTABSENT
2671		DIAG-XMIT
3040		DIAG-ERRSTAT (ENCIN)
3041		DIAG-ERRSTAT (CRL)
3042		DIAG-ERRSTAT (TRUNC)
3043		DIAG-ERRSTAT (2LONG)
3044		DIAG-ERRSTAT (BADEOF)
3045		DIAG-ERRSTAT (ENCOUT)
3046		DIAG-ERRSTAT (BADORD)
3047		DIAG-ERRSTAT (DISC3)
304F		DIAG-INIT
305F		DIAG-PORTDIED

Table A-8. Error Message Codes Defined *(continued)*

Error Number	Test Name	Error Name
3060		DIAG-STATS (FIX)
3061		DIAG-STATS (FRX)
3062		DIAG-STATS (C3FRX)
306E		DIAG-DATA
306F		DIAG-TIMEOUT
3070		DIAG-PORTABSENT
3071		DIAG-XMIT
3078		DIAG-PORTWRONG
384F	spinSilk	DIAG-INIT
385F		DIAG-PORTDIED
3840		DIAG-ERRSTAT (ENCIN)
3841		DIAG-ERRSTAT (CRC)
3842		DIAG-ERRSTAT (TRUNC)
3843		DIAG-ERRSTAT (2LONG)
3844		DIAG-ERRSTAT (BADEOF)
3845		DIAG-ERRSTAT (ENCOUT)
3846		DIAG-ERRSTAT (BADORD)
3847		DIAG-ERRSTAT (DISCC3)
3870		DIAG-PORTABSENT
3871		DIAG-XMIT
3874		DIAG-PORTSTOPPED

Error Message Tables

Table A-9 matches each error number with the test that caused the error and the name of the error.

Table A-9. Diagnostic Error Messages

Message	Description	Probable Cause	Action
DIAG-BADINT `Err#1030, 2030` [centralMemoryTest, cmlTest]	Port received an interrupt when not expecting one	ASIC failure	Replace main-board assembly

Table A-9. Diagnostic Error Messages *(continued)*

Message	Description	Probable Cause	Action
DIAG-BUS_TIMEOUT Err#0B0F, 4040F [portRegTest, sramRetention-Test]	ASIC register or ASIC SRAM did not respond to an ASIC data access	ASIC failure	Replace main-board assembly
DIAG-CAMINIT Err#223B [camTest]	Port failed to initialize due to one of the following reasons: • Switch not disabled • Diagnostic queue absent • Malloc failed • Chip is not present • Port is not in loopback mode • Port is not active	Software operational setup error or mainboard failure	Retry, reboot or replace main-board assembly
DIAG-CAMSID Err#223C [camTest]	ASIC failed SID NO translation test	ASIC failure	Replace main-board assembly
DIAG-CLEAR_ERR Err#0001	Port's diag error flag (OK or BAD) is cleared	Informational only	None required
DIAG-SMBISRF Err#1021 [centralMemoryTest]	ASIC's Central Memory SRAMS did not complete the BISR within the timeout period	ASIC failure	Replace main-board assembly
DIAG-CMBISRTO Err#1020 [centralMemoryTest]	ASIC's Central Memory SRAMS did not complete the BISR within the timeout period	ASIC failure	Replace main-board assembly
DIAG-CMERRPTN Err#102B [centralMemoryTest]	Error detected at the wrong port	ASIC failure	Replace main-board assembly
DIAG-CMERRTYPE Err#102A [centralMemoryTest]	Port got the wrong CMEM error type	ASIC failure	Replace main-board assembly
DIAG-CMICKSUM Err#2036 [cmiTest]	CMI message received failed bad checksum test	ASIC or mainboard failure	Replace main-board assembly
DIAG-CMIDATA Err#2035 [cmiTest]	CMI data received did not match date transmitted	ASIC or mainboard failure	Replace main-board assembly
DIAG-CMIINVCAP Err#2034 [cmiTest]	Unintended ASIC erroneously got CMI capture flag	ASIC or mainboard failure	Replace main-board assembly

Table A-9. Diagnostic Error Messages *(continued)*

Message	Description	Probable Cause	Action
DIAG-CMINOCAP Err#2033 [cmiTest]	CMI intended receiver ASIC failed to get CMI capture flag	ASIC or mainboard failure	Replace mainboard assembly
DIAG-CMISA1 Err#2032 [cmiTest]	An attempt to send a CMI message from ASIC to ASIC failed	ASIC failure	Replace mainboard assembly
DIAG-CMNOBUF Err#1029 [centralMemoryTest]	Port could not get any buffer	ASIC failure	Replace mainboard assembly
DIAG-DATA Err#266E, 306E [portLoopbackTest, crossPortTest]	Payload received by port did not match payload transmitted	Mainboard, GBIC module or fiber cable failure	Replace mainboard assembly, GBIC module or fiber cable
DIAG-ERRSTAT Err#2640 - 2647, 3040 - 3047, 3840 - 3847 [portLoopbackTest, crossPortTest, spinSilk]	Port Error Statistics counter is nonzero, meaning an error was detected when receiving frames. One of the following status errors occurred: • **Enc_In:** Encoding error, inside frame • **CRC_err:** Cyclic redundancy check on frame failed • **TruncFrm:** Truncated frame • **FrmTooLong:** Frame too long • **BadEOF:** Bad end of file. • **Enc_out:** Encoding error, outside frame • **BadOrdSet:** Bad symbol on fiber-optic cable • **DiscC3:** Discarded Class 3 frames	ASIC, mainboard, GBIC module or fiber cable failure	Replace mainboard assembly, GBIC module or fiber cable
DIAG-INIT Err#264F, 304F, 384F [portLoopbackTest, crossPortTest, spinSilk]	Port failed to go active in the loopback mode requested	ASIC, mainboard, GBIC module or fiber cable failure	Replace mainboard assembly, GBIC module or fiber cable
DIAG-INTNIL Err#2031 [cmlTest]	ASIC failed to get a CMI error (interrupt)	ASIC failure	Replace mainboard assembly

Table A-9. Diagnostic Error Messages *(continued)*

Message	Description	Probable Cause	Action
DIAG-INTNOTCLR Err#102C [centralMemoryTest]	The interrupt bit could not be cleared	ASIC failure	Replace mainboard assembly
DIAG-LCMEM Err#1027 [centralMemoryTest, cmemRetentionTest]	Data read from the Central Memory location did not match data previously written into the same location	ASIC failure	Replace mainboard assembly
DIAG-LCMEMTX Err#1F27, 1028 [centralMemoryTest]	Central Memory transmit path failure: ASIC 1 failed to read ASIC 2 via the transmit path	Mainboard failure	Replace mainboard assembly
DIAG-LCMRS Err#1F25, 1025 [centralMemoryTest, cmemRetentionTest]	Central Memory Read Short: M bytes requested but got less than M bytes	ASIC failure	Replace mainboard assembly
DIAG-LCMTO Err#1F26, 1026 [centralMemoryTest, cmemRetentionTest]	Central Memory Timeout: Data transfer initiated did not complete within the timeout period	ASIC failure	Replace mainboard assembly
DIAG-MEMNULL Err#0112 [ramTest]	Test failed to malloc	Mainboard failure	Replace mainboard assembly
DIAG-MEMSZ Err#0111 [ramTest]	Memory size to be tested is less than or equal to zero	Mainboard failure	Replace mainboard assembly
DIAG-MEMORY Err#0110 [ramTest]	Data read from RAM location did not match previously written data into same location	CPU RAM failure	Replace mainboard assembly or DRAM module
DIAG-PORTABSENT Err#2670, 3070, 3870 [portLoopbackTest, crossPortTest, spinSilk]	Port is not present	ASIC or mainboard frame	Replace mainboard assembly
DIAG-PORTDIED Err#265F, 305F, 385F [portLoopbackTest, crossPortTest, spinSilk]	Port was in loopback mode and then went inactive	ASIC, GBIC module or fiber cable failure	Replace mainboard assembly, GBIC module or fiber cable
DIAG-PORTSTOPPED Err#3874 [spinSilk]	Port is no longer transmitting as indicated by the Number of Frames Transmitted counter being stuck at N frames	ASIC, GBIC module or fiber cable failure	Replace mainboard assembly, GBIC module or fiber cable
DIAG-PORTWRONG Err#3078 [crossPortTest]	Frame erroneously received by port M instead of the intended port N	ASIC failure	Replace mainboard assembly

Table A-9. Diagnostic Error Messages *(continued)*

Message	Description	Probable Cause	Action
DIAG-POST_SKIPPED `Err#0004` [switch initialization]	POST is skipped; its message recommended that POST be executed	Information only	None required
DIAG-REGERR `Err#0B15, 0415` [portRegTest, sramRetentionTest]	Data read from ASIC register or ASIC SRAM did not match data previously written into same location	ASIC failure	Replace mainboard assembly
DIAG-REGERR_UNRST `Err#0B16, 0416` [portRegTest, sramRetentionTest]	Port failed to reset	ASIC failure	Replace mainboard assembly
DIAG-STATS `Err#2660 – 2662, 3060 – 3062` [portLoopbackTest, crossPortTest]	Port counter value did not match the number of frames actually transmitted. Possible counters reporting: FramesTx: Number of frames transmitted FramesRx: Number of frames received Cl3FrmRx: Number of Class3 frames received	ASIC, GBIC module or fiber cable failure	Replace mainboard assembly, GBIC module or fiber cable
DIAG-TIMEOUT `Err#266F, 306F, 386F` [portLoopbackTest, crossPortTest, centralMemoryTest]	For portLoopbackTest and crossPortTest: Port failed to receive frame within timeout period For centralMemoryTest: Port failed to detect an interrupt within the timeout period	ASIC, GBIC module or fiber cable failure	Replace mainboard assembly, GBIC module or fiber cable
DIAG-XMIT `Err#2271, 2671, 3071, 3871` [portLoopbackTest, crossPortTest, spinSilk, camTest]	Port failed to transmit frame	ASIC failure	Replace mainboard assembly
CONFIG CORRUPT	The switch configuration information has become irrevocably corrupted	OS error	Contact customer support
CONFIG OVERFLOW	The switch configuration information has grown too large to be saved or has an invalid size	OS error	Contact customer support
CONFIG VERSION	The switch has encountered an unrecognized version of the switch configuration	OS error	Contact customer support

Table A-9. Diagnostic Error Messages *(continued)*

Message	Description	Probable Cause	Action
FABRIC, SEGMENTED, LOG_WARNING	Fabric segmented	Incompatible fabric parameters/ switches Conflict zones	Contact customer support
FABRIC, NO_ALIASID, LOG_WARNING	No free multicast alias	Too many multicast groups in use	Contact customer support
FABRIC, BADILS, LOG_WARNING	Bad ISL-ELS size	The ISL-ELS payload is wrong	Contact customer support
FLASH, BAD_MIRROR, LOG_WARNING	The system's flash memory has encountered an error	OS error	Contact customer support
RPC, SV_EXIT	An RPC service daemon has terminated prematurely or unexpectedly	OS error	Contact customer support
RPC, SVC_REG	An RPC service daemon could not establish service for a particular protocol handler	Fan failure	Contact customer support
TEMP, 1_FAILED, LOG_WARNING	Switch overheated	Fan failure	Contact customer support
TEMP, 2_FAILED, LOG_WARNING	Switch overheated	Fan failure	Contact customer support
TEMP, 3_FAILED, LOG_WARNING	Switch overheated	Fan failure	Contact customer support
TEMP, 4_FAILED, LOG_WARNING	Switch overheated	Fan failure	Contact customer support
TEMP, 5_FAILED, LOG_WARNING	Switch overheated	Fan failure	Contact customer support
FANS, 1_FAILED, ERROR	Switch overheated	Fan failure	Contact customer support
FANS, 2_FAILED, ERROR	Switch overheated	Fan failure	Contact customer support
FANS, 3_FAILED, ERROR	Switch overheated	Fan failure	Contact customer support
FANS, 4_FAILED, ERROR	Switch overheated	Fan failure	Contact customer support
FANS, 5_FAILED, ERROR	Switch overheated	Fan failure	Contact customer support
FANS, 6_FAILED, ERROR	Switch overheated	Fan failure	Contact customer support

Table A-9. Diagnostic Error Messages *(continued)*

Message	Description	Probable Cause	Action
POWER, 1_FAILED, LOG_CRITICAL	Switch Power Failure	Power supply failure	Contact customer support
POWER, 2_FAILED, LOG_CRITICAL	Switch Power Failure	Power supply failure	Contact customer support
FCIU, IUBAD, L,S	Invalid IU	OS error	Contact customer support
FCUI, IUCOUNT, L,S	Total number of IUs Count < 0	OS error	Contact customer support
FCUI, IUCOUNT, L, S	Total number of IUs Count < 0	OS error	Contact customer support
FCPH, EXCHBAD, L, S	Bad exchange	OS error	Contact customer support
FCPH, EXCHFREE, L, S	Unable to free an exchange	OS error	Contact customer support
MQ, QWRITE, L, M	Message queue overflow	Task blocked	Contact customer support
MQ, QREAD, L, M	Message queue unread	OS error	Contact customer support
MQ, MSGTYPE, E, M	Unknown message type	OS error	Contact customer support
SEMA, SEMGIVE, L, M	Unable to give a semaphore	OS error	Contact customer support
SEMA, SEMTAKE, L, M	Unable to take a semaphore	OS error	Contact customer support
SEMA, SEMFLUSH, L, M	Unable to flush a semaphore	OS error	Contact customer support
PANIC, TASKSPAWN, LOG_PANIC	Task creation failed	OS error	Contact customer support
PANIC, SEMCREATE, LOG_PANIC	Semaphore creation failed	OS error	Contact customer support
PANIC, SEMDELETE, LOG_PANIC	Semaphore deletion failed	OS error	Contact customer support
PANIC, QCREATE, LOG_PANIC	Message queuer failed	OS error	Contact customer support
PANIC, QDELETE, LOG_PANIC	Message queuer deletion failed	OS error	Contact customer support

Table A-9. Diagnostic Error Messages *(continued)*

Message	Description	Probable Cause	Action
PANIC, MALLOC, LOG_PANIC	Memory allocation failed	OS error	Contact customer support
PANIC, FREE, LOG_PANIC	Memory free failed	OS error	Contact customer support
PANIC, INCONSISTENT, LOG_PANIC	Data out of sync	OS error	Contact customer support
PANIC, INTCONTEXT, LOG_PANIC	Data out of sync	OS error	Contact customer support
PANIC, ZOMTIMESET, LOG_PANIC	Attempt to set a zombie timer	OS error	Contact customer support
PANIC, ZOMTIMKILL, LOG_PANIC	Zombie timer destroyed	OS error	Contact customer support
PANIC, FREETIMRLSD, LOG_PANIC	Free timer released	OS error	Contact customer support
PANIC, TIMEUSECNT, LOG_PANIC	Timer use count exceeded	OS error	Contact customer support
PANIC, LSDB_CKSUM, LOG_PANIC	Link State Database checksum failed	OS error	Contact customer support
SYS, NOMEM, LOG_CRITICAL	No memory	OS error	Contact customer support
SYS, SYSCALL, LOG_ERROR	System call failed	OS error	Contact customer support
SYS, BADPTR, LOG_ERROR	Bad system pointer	OS error	Contact customer support
SYS, INTRPT, LOG_CRITICAL	Bad system interrupt	OS error	Contact customer support
SYS, FLASHRD, LOG_ERROR	FLASH memory read error	OS error	Contact customer support
SYS, FLASHWR, LOG_ERROR	FLASH memory write error	OS error	Contact customer support
TIMERS, ENQFAIL, LOG_CRITICAL	Invalid timeout value	OS error	Contact customer support
TIMERS, MSG, LOG_WARNING	Invalid message	OS error	Contact customer support
FLANNEL, PHANTOM, LOG_WARNING	Port's PLT limit exceeded	OS error	Contact customer support

Table A-9. Diagnostic Error Messages *(continued)*

Message	Description	Probable Cause	Action
ASIC, MINI_BUFFER, LOG_WARNING	ASIC failure	OS error	Contact customer support
LSDB, LSID, LOG_ERROR	Link State ID out of range	OS error	Contact customer support
LSDB, NOLOCALENTRY, LOG_CRITICAL	No database entry for local Link State Record	OS error	Contact customer support
LSDB, NOLSR, LOG_WARNING	No Link State Record for domain	OS error	Contact customer support
LSDB, MAXINCARN, LOG_WARNING	Local Link State Record reached max incarnation	OS error	Contact customer support
FLOOD, INVLSU, LOG_WARNING	Discard received	OS error	Contact customer support
FLOOD, INVLSR, LOG_WARNING	Unknown LSR type	OS error	Contact customer support
FLOOD, LSRLEN, LOG_ERROR	Excessive LSU length	OS error	Contact customer support
HLO, INVHLO, LOG_ERROR	Invalid Hello received from port	OS error	Contact customer support
HLO, HLOTIMEOUT, LOG_ERROR	Incompatible Hello timeout from port	OS error	Contact customer support
HLO, DEADTIMEOUT, LOG_ERROR	Incompatible inactivity timeout from port	OS error	Contact customer support
FSPF, SCN, LOG_WARNING	Illegal SCN	OS error	Contact customer support
FSPF, NBRCHANGE, LOG_WARNING	Wrong neighbor ID in Hello message from port	OS error	Contact customer support
FSPF, INPORT, LOG_ERROR	Input port out of range	OS error	Contact customer support
FSPF, VERSION, LOG_ERROR	FSPF version not supported	OS error	Contact customer support
FSPF, SECTION, LOG_ERROR	Wrong Section ID	OS error	Contact customer support
FSPF, REMDOMAIN, LOG_ERROR	Remote Domain ID out of range	OS error	Contact customer support
NBFSM, NGBRSTATE, LOG_ERROR	Wrong input to neighbor FSM	OS error	Contact customer support

Table A-9. Diagnostic Error Messages *(continued)*

Message	Description	Probable Cause	Action
MCAST, ADDPORT, LOG_WARNING	Add port failed	OS error	Contact customer support
MCAST, REMPORT, LOG_WARNING	Remove port failed	OS error	Contact customer support
MCAST, ADDBRANCH, LOG_ERROR	Add branch failed	OS error	Contact customer support
MCAST, REMBRANCH, LOG_ERROR	Remove branch failed	OS error	Contact customer support
MCAST, NOPARENT, LOG_ERROR	Null parent	OS error	Contact customer support
MCAST, NOPARENTLSR, LOG_ERROR	Null lsrP	OS error	Contact customer support
UCAST, ADDPATH, LOG_CRITICAL	Add path failed	OS error	Contact customer support
UCAST, ADDPORT, LOG_WARNING	Add port failed	OS error	Contact customer support
UCAST, REMPORT, LOG_WARNING	Remove port failed	OS error	Contact customer support
UCAST, RRTIM, LOG_CRITICAL	Invalid reroute timer ID	OS error	Contact customer support
UCAST, SPFCOST, LOG_WARNING	No minimum cost path in candidate	OS error	Contact customer support
UCAST, RELICPDB, LOG_WARNING	Relic PDB to Domain	OS error	Contact customer support

Glossary

The following list defines or identifies technical terms, abbreviations, and acronyms used in Del™l user documents.

A
ampere(s)

AC
alternating current

Alias Server
A fabric software facility that supports multicast group management.

Arbitrated Loop
The FC Arbitrated Loop (FC-AL) is a standard defined on top of the FC-PH standard. It defines the arbitration on a loop where several FC nodes share a common medium.

ASCII
American National Standards Institute

BIOS
basic input/output system

C
Celsius

CAM
content addressable memories

CD
compact disc

Class 2
In Class-2 service, the fabric and destination N_Port provide connectionless service with notification of delivery or nondelivery between the two N_Ports.

Class 3
Class-3 service provides a connectionless service without notification of delivery between N_Ports. The transmission and routing of Class-3 frames is the same as for Class-2 frames.

cm
centimeter(s)

Community (SNMP)
An SNMP community is a relationship between an SNMP agent and a set of SNMP managers that defines authentication, access control, and proxy characteristics.

CM
configuration management

CMEM
central memory

CMI
communication management interface

CPU
Central processing unit

Credit
Credit, applied to a switch, is a numeric value that represents the maximum number of receive buffers provided by an F_Port or FL_Port to its attached N_Port or NL_Port respectively such that the N_Port or NL_Port may transmit frames without over-running the F_Port or NL_Port.

Domain_ID
The domain number uniquely identifies the switch in a fabric. This switch domain ID is normally automatically assigned by the switch and may be any value between 0 and 239. This number may also be assigned manually.

DMA
direct memory access

E_Port
A port is designated an E_Port when it is used as an interswitch expansion port to connect to the E_Port of another switch to build a larger switch fabric.

E_D_TOV (Error Detect Time Out Value)
E_D_TOV (Error-Detect Time-Out Value) defines the time the switch waits for an expected response before declaring an error condition. The error detect time out value is adjustable in 1ms increments from 2 seconds up to 10 seconds.

Fabric
The name applied to a network resulting from the interconnection of switches and devices comprised of high-speed fiber connections. A fabric is an active, intelligent, nonshared interconnect scheme for nodes.

FL_Port
The FL_Port is the fabric access port used to connect NL_Ports to the switch in a loop configuration.

F_Port
The F_Port is the fabric access port used to connect an N_Port.

FC_PH
Fibre Channel Physical and Signaling Interface.

FSPF
Fibre-Channel shortest path first.

FRU
field replaceable units

GBIC
gigabit interface converter.

G_Port
A port is designated as a G_Port when it has not assumed a specific function. A G_Port is a generic switch port that can operate either as an E_Port or an F_Port. A port is defined as a G_Port, for example, when it is not connected or has not yet assumed a specific function in the fabric.

HIP
Hardware Instrumentation Package

HSSDC
high speed serial data connectors

Hz
hertz

I/O
input/output

IEC
International Electronic Commission

Interswitch Link (ISL)
ISL is a fiber link between two switches.

IP
internet protocol

ISL
Inter switch link

Isolated E_Port
ISL is online but not operational between switches because of overlapping domain ID or nonidentical parameters such as E_O_TOVs.

LAN
local area network

LCD
liquid crystal display

LED
light-emitting diode

Loop
A loop is a configuration of devices (for example, JBODs) connected to the fabric via an FL_Port interface card.

Management information base (MIB)
Used to send detailed status/commands from or to an SNMP managed device.

MIB
Management information base.

Multicast
Multicast is used when multiple copies of data are to be sent to designated multiple destinations.

N_Port
The N_Port is the designation of an equipment port connected to the fabric.

NL_Port
The NL_Port is the designation of an equipment port connected to the fabric in a loop configuration via an FL_Port.

NNM SE
Network Node Manager Special Edition.

Power-on self-test (POST)
The POST is a series of self-tests which run each time the unit is booted or reset.

POST
Power-on self-test.

programmable read-only memory (PROM)
A chip that can only be programmed once.

PROM
programmable read-only memory

RAM
random access memory

Resource Allocation Time Out Value (R_A_TOV)
R_A_TOV is used to time out operations that depend on the maximum possible time that a frame could be delayed in a fabric and still be delivered. The value of R_A_TOV is adjustable in 1-microsecond increments over a range from 10 to 120 seconds.

ROM
read-only memory

rpm
revolutions per minute

SAN
storage area network.

SC
subscriber connector

SCSI
small computer system interface

Simple Network Management Protocol (SNMP)
SNMP is a TCP/IP protocol that generally uses the User Datagram Protocol (UDP) to exchange messages between a management information base and a management client residing on a network. Since SNMP does not rely on the underlying communication protocols, it can be made available over other protocols, such as UDP/IP.

SNMP
Simple Network Management Protocol

SNMPv1
The original standard for SNMP is now referred to as SNMPv1.

SNS
simple name server

SRAM
static random-access memory

Trap (SNMP)
A trap is a mechanism for SNMP agents to notify the SNMP management station of significant events.

UDP
User Datagram Protocol

Unicast
Unicast routing provides one or more optimal path(s) between any of two

switches that make up the fabric. This is for a single copy of the data to be sent to designated destinations.

U_Port
A U_Port has not assumed a specific function. It is a generic port that can operate either as an E_Port, an F_Port, or an FL_Port. For example, a port that is not connected or has not assumed a specific function in the fabric is designated as a U_Port.

VAC
volts alternating current

VC
virtual channel

World wide Name (WWN)
A WWN uniquely identifies a switch on local and global networks.

WWN
world wide name

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